# 

**AUTOMOTIVE and AVIATION MANUFACTURING** 

Civilian and Defense

MAY 1, 1951

Materials Handling Issue ...

Modern Automotive Methods
Installations at New Eritish Plant
Double Duty Aircraft Tachsique
New Equipment of Chicago Exposition

Complete Table of Confeets, Page 3

A CHILTON PUBLICATION



# Fills tall order on big grinding job . . .

The men of a midwest grinding company had a big job on their hands and an almost equal amount of trouble!

The job called for one-pass grinding of hard metal rolls 33 feet long and 10½ inches in diameter, with the diameter held to a tolerance of 0.0002 of an inch. Wheel loading and feedwheel glazing made it difficult to hold the size. Check marks and rusting of the rolls added to the troubles.

Operators took the advice of a Standard Oil lubrication specialist and switched the operation from the conventional coolant being used to SUPERLA Soluble Oil. As a result, wheels stayed clean, and the size was held with little trouble. The desired finish was obtained on the rolls. Rust ceased to be a problem.

SUPERLA Soluble Oil can do a superior job in your plant . . . not only on grinding jobs but SUPERLA REG. U. S. PAT. OFF. Soluble Oil

on a variety of machining operations. It provides excellent tool life and finish as well as superior rust prevention.

To get help with your cutting-oil problems, obtain the services of the Standard Oil lubrication specialist located near your plant. A phone call to your local Standard Oil office will bring him to your plant. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

# What's YOUR problem?



P. E. Stratton, lubrication specialist in Standard Oil's Detroit office, gave the expert advice that solved a big problem for this midwest grinding company.

Whatever problems you may face in your plant, Standard Oil has a corps of lubrication specialists located throughout the Midwest ready to help you solve them. One of these men is near your plant. His wide experience and special training in the use of modern lubricants and cutting fluids will help you make real savings.

Why not arrange for his visit today by contacting the nearest Standard Oil (Indiana) office? And ask him about the advantages of . . .

STANICUT Cutting Oils—These specialduty cutting oils meet today's most exacting requirements and highest production schedules. Grades varying in viscosity and compounding are available, each containing the correct proportions of extreme-pressure and frictionreducing ingredients.

STANOSTAMP Compounds—Here are three established products for stamping or heavy drawing operations on either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications.

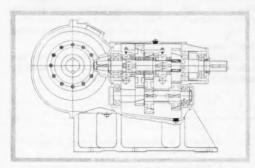
STANOSTAMPS offer maximum protection for dies and work, can be readily removed in conventional washing equipment.

SUPERLA Quenching Oil—From Standard Oil's complete line of quenching oils, this product is recommended for quenching work in systems where cooling facilities are limited and bath temperatures are high. It is a medium-bodied oil of red color. It provides efficient quenching of large forgings.

STANDARD

STANDARD OIL COMPANY (INDIANA)

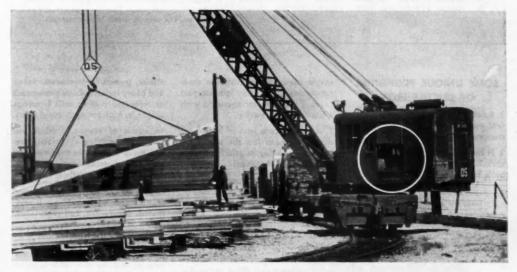
# "Engineered-to-order" MADE BY OHIO LOCOMOTIVE CRANE CO.



Required by Ohio: a three-speed locomotive crane transmission of unusual ruggedness, for continuous heavy-duty service and with multiple speed changes to meet all operating conditions.



This special constant-mesh COTTA Transmission, helical type, was designed with right-angle drive to meet Ohio's needs. The built-in safety factors assure dependable performance, long life.



Because the terrific grind of a locomotive crane in action demands precision design and manufacture of essential parts, Ohio Locomotive has for 20 years come to COTTA for transmissions with the extra endurance required for heavy-duty jobs. If you have a special problem in power transmission, let our engineering staff help you. Write today. COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



### **DUCTILE IRON**

### A Revolutionary Metallurgical Development

**DUCTILE IRON** is a cast ferrous product which combines the *process advantages* of cast iron with many of the *product advantages* of cast steel.

No longer in the pilot-plant stage, this new material is now produced and sold on the basis of specifications. Not only are its individual properties exceptional, but no other common engineering material provides such a combination of excellent castability and fluidity, with high strength, toughness, wear resistance, and machinability.

Actually, "ductile iron" denotes not a *single* product, but rather a family of ferrous materials characterized by graphite in the form of spheroids... a form controlled, in a broad sense, by small amounts of magnesium. Presence of spheroidal rather than flake graphite gives this new product a ductility that is unique among gray cast irons.

Four important types of ductile iron now being produced commercially are tabulated below.

#### REPRESENTATIVE MECHANICAL PROPERTIES OF COMMERCIAL HEATS OF DUCTILE IRON

Grade	Tensile strength, psi	Yield strength, psi	Elongation per cent	BHN	Usual condition
90-65-02	95/105000	70/75000	- 2.5/5.5	225/265	As-cost
80-60-05	85/95000	65/70000	5.5/10.0	195/225	As-cast
60-45-15	65/75000	50/60000	17.0/23.0	140/180	Annealed
80-60-00	85/95000	65/75000	1.0/3.0	230/290	As-cust
	90-65-02 80-60-05 60-45-15	Grade strength, psi 90-65-02 95/105000 80-60-05 85/95000 60-45-15 65/75000	Grade         atrength, psi         strength, psi           90-65-02         95/103000         70/75000           80-60-05         85/95000         65/70000           60-45-15         65/75000         50/60000	Grade         strength, psi         strength, psi         Elongation per cent           90-65-02         95/10500         70/7500         2.2.5/5.5           80-60-03         85/95000         65/70000         5.5/10.0           60-45-15         65/75000         30/6000         17.0/23.0	Grade         strength, psi         strength, psi         Elongation per cent         BHN           90-65-02         95/105000         70/75000         2.5/5.5         225/265           80-60-03         85/95000         65/70000         5.5/10.0         195/225           60-45-15         65/75000         50/60000         17.0/23.0         140/180

- A Pearlitic in structure. Provides good mechanical wear resistance.
- B Pearlitic-ferritic in structure. Provides strength and toughness combined.
- C A fully ferritic structure usually obtained by short anneal of either (A) or (B). Provides optimum machinability and maximum toughness.
- D Higher phosphorous content than preceding grades; also higher manganese. Provides high strength and stiffness, but only moderate impact strength.

### SOME UNIQUE PROPERTIES OF DUCTILE IRON

- 1. Its elastic modulus, about 25,000,-000 psi, is virtually unaffected by composition or thickness...
- 2. It can provide a chilled, carbidic, abrasion-resistant surface supported by a tough ductile core. No other



Dept. AI, 67 Wall Street New York 5, N. Y. Please send me a list of publications on:

DUCTILE IRON

Name Title
Company
Address
City State

single material can combine these properties...its only counterpart being a tough material coated with a hard welded overlay.

- 3. As-cast ductile iron of 93,000 psi tensile strength has the same machinability rating as gray iron with a strength of 45,000 psi.
- 4. Annealed ductile iron can be machined at a rate 2 to 3 times that of good quality gray iron.
- 5. It can be satisfactorily welded.

#### **APPLICATIONS**

Automotive, agricultural implement, railroad and allied industries apply ductile iron, as-cast and heat treated, in components too numerous to detail.

Machinery, machine tools, crank-

shafts, pumps, compressors, valves and heavy industrial equipment such as rolls and rolling mill housings, utilize its high strength and rigidity.

In scores of engine, furnace and other parts serving at elevated temperatures, it provides oxidation and growth resistance heretofore unavailable in high carbon castings.

Other applications include paper, textile and electrical machinery, marine equipment, and pipe.

#### **AVAILABILITY**

Send us details of your prospective uses, so that we may offer a list of sources from some 100 authorized foundries now producing ductile cast iron under patent licenses. Request a list of available publications on ductile iron...mail the coupon now.

### THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, NEW YORK 5, N.Y.

# INDUSTR

May 1, 1951

Vol. 104, No. 9

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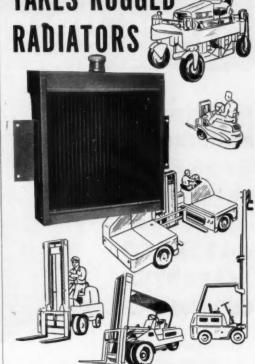
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RUTOMOTIVE MATERIAL HANDLING TAKES RUGGED



#### TAILOR-MADE YOUNG DESIGN ASSURES OPTIMUM HEAT TRANSFER FOR LIFT TRUCKS

Many of the biggest names in the lift-truck business rely on Young for their radiator requirements. Thorough analysis of the cooling problems ... such as heavy, intermittent lifting in heated atmosphere and accompanying stress and strain . . . results in the design and development of radiators especially suited to lift truck applications. Exhaustive testing, high-speed production and controlled quality assure reliable delivery of a product worthy of the Young Quality trade-mark. A Young Sales Engineer will gladly explain the design advantages of Young Radiators at your convenience.

HEAT TRANSFER PRODUCTS FOR AUTOMOTIVE AND INDUSTRIAL APPLICATIONS.



HEATING, COOLING, AND AIR CONDITIONING PRODUCTS FOR HOME AND INDUSTRY.

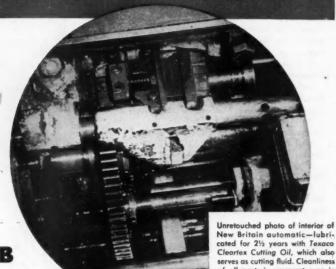
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# THIS DUAL PURPOSE OIL STEPS UP PRODUCTION

New England
manufacturer\*
also gets longer
tool life,
cleaner operation
with TEXACO
CLEARTEX
CUTTING OIL B



cleariex Cutting fluid. Cleanliness of all parts is apparent even in the photograph. Actual inspection of the machine would reveal complete freedom from gum and sludge, little or no wear.

Texaco Cleartex Cutting Oil B—as both cutting fluid and machine lubricant in their New Britain automatics. Results are notably better than those obtained when separate cutting and lube oils were used. Production is up; costs are down.

Machines are in regular production, 16 hours a day, on No. 430 stainless steel. Setup includes drilling, forming and cut-off operations. With *Texaco Cleartex Cutting Oil B*, drill life has been stepped up to one million pieces, and a circular form tool is good for two million pieces.

Another impressive fact is the exceptional cleanli-

ness of the interior of the lubricating side after 2½ years' use (see illustration) . . . and, of course, there has been no wastage due to contamination of the coolant by the lube oil—as when two oils were used.

Whatever your metal cutting operations, there are Texaco Cutting, Grinding and Soluble Oils to help you do them better, faster, and at lower cost. A Texaco Lubrication Engineer will gladly work with you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

\*Name of this Texaco user on request



## TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.



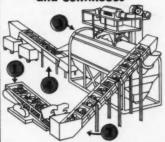
EARLY reports from one of America's foremost automobile makers show its new Pangborn Continuous-Flo ROTO-BLAST Barrel increases production and reduces costs. Forgings are cleaned at a 59% saving over pickling...including all costs for materials, maintenance, power and labor!

Labor costs are down because manual handling is eliminated. Cleaning has been stepped up to an average rate of 12 tons per hour . . . 17 tons an hour on some forgings. And a public relations problem has been solved because pickling acid no longer pollutes nearby streams.

GET THE FACTS ON PANGBORN ROTOBLAST. Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST Machine to clean faster, better and cheaper. Bulletin 214 gives full details. For your free copy write: Pangborn Corp., 3900 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

### Operation is Automatic and Continuous



- forgings are dumped from tubs ento an independent loading conveyor.
- 2. An integral flight conveyor feeds forgings to Barrel at an even rate.
- 3. Work moves continuously through Barrel while being cleaned by two ROTO-BLAST streams.
- 4. Forgings are discharged from Barrel to tubs by automatic conveyor. No manual handling is necessary.

TRADEMARK OF PANGBORY CORPORATION



BLAST CLEANS CHEAPER

with the right equipment for every job



EASY RIDER . . .
EASY RISER
HYSTER 40

The Hyster 40\* is a mighty handy machine to have around both in a crowded factory and the wide open spaces of yard storage. It's speedy . . . powerful . . . lifts a 4000-lb, load 9 feet with standard uprights (12 feet with optional uprights) to the underside of the load . . . has trunnion steering for maximum maneuverability. ASSF Bearings are used in the transmission and in both front and rear wheels. Manufacturers of every type of heavyduty automotive equipment prefer ASSF. They've learned from experience that ASSF is uniformly high in quality and dependability . . . that ASSF, by reducing friction, aids materially in better, smoother performance, more economical operation and maintenance. 7249

\*For further information regarding the Hyster 40, write Hyster Company, 2902-33 N. E. Clackamas Street, Portland 8, Oregon.





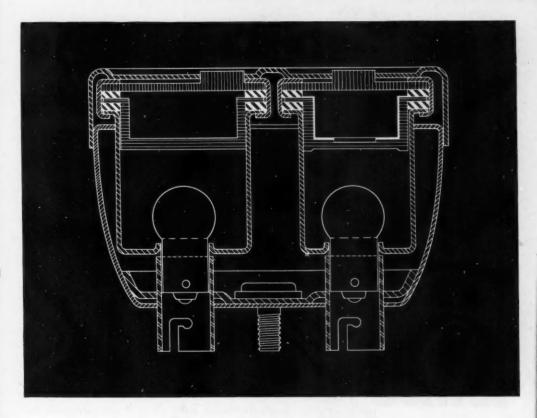
integrity craftsmanship metallurgy tolerance control surface finish product uniformity engineering service field service



SKF INDUSTRIES, INC., Phila. 32, Pa.

manufacturers of

skf and Hess-bright bearings



### Cork-and-rubber gaskets to meet military needs

Here are some of the questions design engineers ask when faced with the problem of choosing cork-and-rubber gasketing materials for military applications.

Do Armstrong's Cork-and-Rubber Compositions meet government specifications?

Yes. There are two classes in MIL-G-6183 (formerly AN-G-32) covering cork-and-rubber gasket materials, each with three grades. There is an Armstrong Composition designed to meet each of the six grades.

What about new cork-and-rubber materials for military equipment for which no suitable material is known?

Armstrong's Research Laboratories are ready to develop new cork-and-rubber materials to meet specific military requirements. Discuss your needs with your Armstrong representative . . . or write.

In what forms are cork-and-rubber gasket materials available?

Armstrong's Cork-and-Rubber is supplied in sheets, ribbons, adhesive-backed tape (made to meet MIL-T-6841, formerly AN-T-84), and in either lathe-cut or die-cut shapes.

What basic polymers are available in cork-and-rubber compositions, and how does the fluids resistance of each compare with the corresponding straight rubber?

Neoprene, Thiokol, Buna N, and Buna S rubbers are available in Armstrong's Cork-and-Rubber Compositions.

Neoprene, Buna S, and Buna N are available in sponged cork-and-rubber materials. The fluids resistance of cork-and-rubber compositions is comparable to straight rubber compounds of corresponding polymers.

Does Armstrong have facilities for testing applications where cork-and-rubber is recommended?

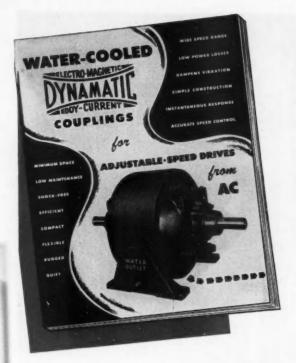
Yes. The laboratories at Armstrong are completely equipped for testing.

Are these materials the same as those used in civilian equipment?

Yes. In the drawing above, for example, one of Armstrong's Cork-and-Rubber Compositions provides a weathertight seal on a stamped signal lamp housing. It conforms to the surface irregularities in both flange and lens and cushions the lens against breakage. In addition, cork-and-rubber has good resistance to fatigue and little tendency to stick to flanges. This means tight resealing when broken lenses or burned-out bulbs are replaced.

For further information on cork-and-rubber compositions and gasket selection, call your Armstrong representative or refer to Armstrong's Gasket Materials manual in Sweet's file for product designers, For a personal copy of this manual, write Armstrong Cork Co., Gaskets and Packings Dept., 1505 Arch St., Lancaster, Pa.

ARMSTRONG'S Gasket Materials



If you want the last word on Eddy-Current Couplings, write for your copy of this new booklet

Eddy-Current Couplings provide a long list of desirable characteristics including instantaneous response, infinitely adjustable speed control, wide speed range, quiet operation, low power losses, low maintenance cost—without mechanical contact between the driving and driven members—and entirely from AC power.

If you are interested in this modern method of speed control, write on your company stationery for this comprehensive booklet. It presents a down-to-earth explanation of the Eddy-Current Principle, and the operation of the Dynamatic Eddy-Current Water-Cooled Coupling.



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Dynamometers Adjusto-Spedes Oil Well Draw-Works Brakes Shovel Clutches • F

ks Brakes • Adjustable-Speed Couplings
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Eddy-Current Brakes Electronic Controls BUILD BETTER DIES WITH



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#### CAP SCREWS AND STRIPPER HOLTS

. . knurled socket heads assure easier, faster driving.

PRECISION DOWEL PINS

... hardened (58-80 Rockwell C) and ground - resist upsetting in driving.



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DIE SPRINGS

pressure ranges to simplify die design-

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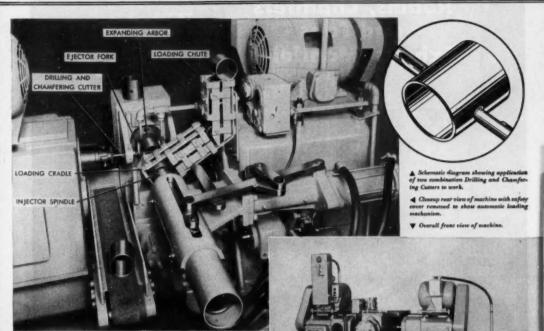
have placed their stamp of approval on a long list of its products. They know from experience the "plus value" in every Western Felt component part. Highest precision in its processing and cutting produces a uniformity that minimizes rejections—prevents failure of the finished product from felt causes. They are available from wool softness to rock hardness—never lose shape—do not ravel or fray—resist oil, water, age—are resilient, flexible, compressible—may be cut to close tolerances.

Acadia Synthetic Products Division, WESTERN FELT WORKS, Processors of Synthetic Rubber — Sheets, Extrusions, Moldod Parts.



# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENEGA FALLS, NEW YORK

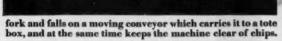


### MODEL "CS" AUTOMATIC DRILLING MACHINE DRILLS SMALL MOTOR FRAMES AT FAST PACE

Problem: To automatically load, drill and chamfer two holes at 180° and automatically eject small motor frames.

Solution: The Model "CS" Automatic Drilling 'Machine selected for this job was equipped with two Drilling Heads and a combination holding, loading and ejection mechanism shown in upper illustration.

In operation, the frames, which have been faced to length in a previous operation, are placed in the loading chute and fed by gravity to the loading cradle where they are picked up by the injector spindle and placed on an air-operated expanding arbor. The injector then retracts to clear the work and the two combination drilling and chamfering cutters advance in rapid traverse to the work piece; then slow down for the length of cutting stroke and finally return in rapid traverse to the starting position. The finished piece is automatically ejected by the ejector



The entire operation is automatic and controlled by cams mounted on a camshaft which synchronizes all machine and loader movements. The loading and unloading takes place during a short dwell milled in the drilling head cams. The operator simply loads the parts in the loading chute, the machine takes over from this point. Production is 600 pieces per hour at 100% efficiency.

Consult Lo-swing engineers about your machining problems,

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

### Mills, Drills, Bores, Reams, Chamfers and Taps Exhaust Manifolds

Another
Transfer-matic
by Cross

- \* 130 pieces per hour at 100% efficiency.
- ★ 10 stations—1 for loading, 4 for milling, 4 for drilling, reaming, boring, 1 for tapping.
- ★ Palletized work-holding fixtures hold parts securely during all operations.
- \* Integral conveyor returns palletized fixtures from last machining station to loading station.
- \* Hydraulically operated power wrench provides automatic operation of work-holding flatures.
- \* Built-in, vibrating type chip conveyor.

Established 1898

THE

DETROIT 7, MICHIGAN

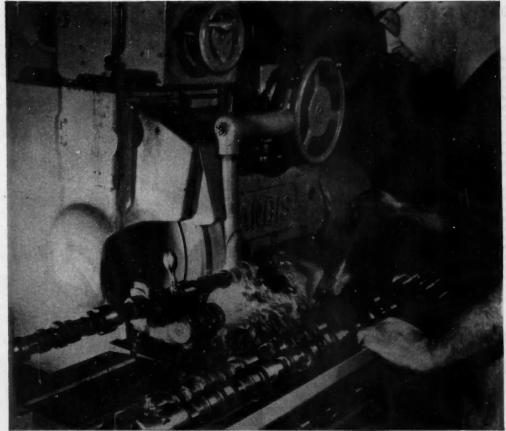
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CO.



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CARBORUNDUM'S BY resinoid bond grinding wheel is designed specifically to meet high finish requirements of camshaft grinding. Excellent form holding qualities...a uniform high cutting rate maintained throughout the grinding cycle...combine to produce accurate cams with improved finishes. Efficient cutting action at reduced contact pressures minimizes heat generation to further protect surface structure of cam lobes. Write Dept. AI 81-9



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# AIR-PAK

### Either Way - You're on THE ROAD TO BETTER POWER BRAKING!

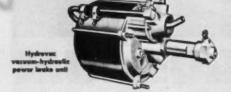
There's no need to be puzzled about the question of efficient power braking for any commercial vehicle. Where the preference is for a hydraulic system, Hydravac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Froducts of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tramendous importance. Remember, regardless of size of valide or whether your preference is for vacuum or air aduated brakes, for the industry's finest power braking systems—specify Bendix\* Hydrovac\* or šendix Air-Pak.

\*BEL U.S. PRT. OF





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### **High Spots of This Issue**

#### MATERIALS HANDLING HEADLINERS .

In line with the Materials Handling event of the year—the current Exposition at Chicago, April 30th thru May 4th, AUTOMOTIVE INDUSTRIES presents these articles of outstanding interest.

#### Materials Handling in Automotive Production-

a review of the vital and unique marvel of mass materials handling as developed by the great automotive manufacturing industries, with a word on the technique of palletizing. Page 34.

#### Foundry Mechanization at Ford-

a pictorial sampling of a vast continuing program in modernized materials handling. Page 37.

#### Improved Handling Methods at GM Vauxhall Plant-

a subject given the greatest attention in this new 191/2 acre factory at Luton, England. Page 38.

#### Conveyorized Testing of Generator Regulators-

the streamlined handling of generator regulators used in Ford, Lincoln, and Mercury passenger cars, and in Ford trucks and tractors. Page 40.

#### Double-Duty Technique That Cuts Aircraft Handling Costs—

a system used at Northrop, where equipment designed to move components and assemblies is made to serve storage or assembly functions also. Page 44.

#### Design That Expedites Handling Body Units-

body design changes at Fisher Body Div. of GM that eliminate damage points in formed surfaces during manufacture, storage and shipment. Page 47.

#### What's New at the Materials Handling Show—

Illustrations and descriptions of numerous new offerings; booth numbers also included. Page 48.

#### 53 New Product Items And Other High Spots, Such As:

A preview of the 1951 Indianapolis Race; decorating plastic parts by metallizing; decentralization of the USAF supply setup; Renault in production on a new Frigate model; the machine tool bottleneck; metals; forged tapered wing spars that reduce plane weight; and an improved finishing machine for zinc base die castings.

News of the Automotive Industries, Page 17 For Complete Table of Contents, See Page 3



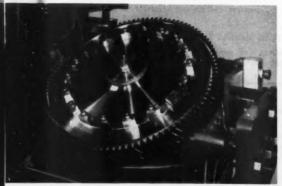
# TO GAIN THE FULL BENEFIT OF ITS POSSIBILITIES...

Basic considerations for a good surface broaching application are rather simple, but perhaps not so well known. They are here listed for those who want to take advantage of the lowcost production possibilities of broaching, but are not quite sure; of the application.

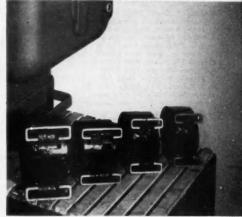
- a) The cutter teeth must pass across the face of the surface to be machined, without interference from work or fixture.
- b) You should have sufficient production on a continuous basis to justify the initial cost of tooling. For instance, a continuous production of 10 to 15 pieces per hour would hardly justify a broaching installation unless there are a number of repetitive cuts, such as the "Christmas tree" slots in turbine wheels.
- b-1) Or on  $\alpha$  lot production basis, you should have a sufficient quantity of similar parts to justify tooling cost plus the change-over time from one part or size to the next. The parts should be of the same general form, and require only minor tool changes.
- c) Other conditions being favorable, several surfaces can be broached simultaneously in one or more settings of the work. For example, several surfaces can be broached in one, two or three work stations, or in one pass of the tool.
- d) The part must be strong enough to withstand the broaching thrust, or at least so designed that it can be adequately supported.
- e) Depth of broaching cut should be uniform, and within as narrow limits as possible.

When you've determined that surface broaching is the best process for the machining operation under consideration, then the next step is to decide on a cincinnati. You'll be choosing a machine that will give you a long life of low-cost, accurate performance. And our Application Engineers are ready to help you with your tooling problems. Write for catalog Nos. M-1389-2 and M-1709-1.

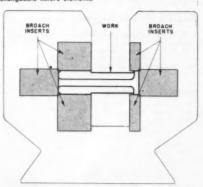
#### THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



Repetitive cuts make this turbine wheel slotting operation economical for broaching.



Similar parts broached on one machine, employing interchangeable fixture elements.



Six surfaces broached simultaneously in one pass of the cutting tools...the "wrap-around" principle.



Left: CINCINNATI Vertical Single Ram H y d r o-Broach. Catalog No. M-1389-2.

Right: CINCINCINATI Vertical Duplex Hydro-Broach. Catalog No. M-1709-1.





CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

# LEUS of the AUTOMOTIVE INDUSTRIES

May 1, 1951

#### 1952 Model Prospects Appear Brighter

All evidence now points to appearance some time next fall or early winter of new models by most automobile manufacturers, unless specifically prohibited by government order. Some of the independents have reported that die work is well along, or completed. New engines are also in process for at least two companies, and possibly more, and chances are excellent that procurement of tooling will be finished in time to permit introduction before year-end.

#### **OPS Considering New** Car Pricing Order

A new order on automobile prices is said to be under consideration by OPS. It is understood that the new pricing formula will be based on cost increase data supplied by manufacturers.

#### Ford of Canada Sets **New Earnings Peak**

Ford Motor Car Co. of Canada, Ltd., established new records in sales production and earnings last year. Net profit was \$19.6 million compared to \$17.2 million in 1949. Profit as per cent of sales, however, dropped last year to 7.9 per cent compared to 8.13 per cent the previous year. Total sales for 1950 were \$248.4 million, an increase of more than \$36 million above the previous year. The Canadian market accounted for the increase, taking 91 per cent of the company's total, compared with 85.8 per cent in 1949. The company's annual report pays tribute to the craftsmanship of employes, and contains several exceptionally fine quality photographs of individual employes at their various johs.

#### Plans for Steel Mill at Detroit Dropped

A new steel mill planned for the Detroit area will apparently not materialize. Gibraltar Steel Corp., a new company, organized in January, has permitted an option on the site for the proposed plant to expire. It had been planned to build a plant with ingot



#### **SEATS FOUR**

The Moretti company of Italy has introduced this new four passenger "600" automobile. The overall length of the car is about 11 ft. Powered by a four-cyl engine with a maximum output of 21 hp at 4200 rpm, it has a speed of about 68 mph.

capacity of 700,000 tons a year, and equipped with hot and cold rolled sheet mills. Estimated cost of the plant was to have been \$100 million. Backers of the venture included Carlton M. Higbie, president of Higbie Mfg. Co., and Cyrus Eaton of Otis & Co.

#### Dip in New Car Sales

The automobile industry today is something like the general who mounted his horse and rode off in several directions. A confused and paradoxical situation has developed over the past few weeks, and finds the industry on one hand reducing production because of materials shortages, while on the other hand it is wondering what has happened to the boom passenger car market. Ordinarily, reduced production has meant a stimulated demand for cars. but reports indicate that new car sales have slumped, although not uniformly for all companies. The expected upturn normally occurring in spring has not yet started, and some are wondering whether sales this spring and summer are going to be as high as had been expected. Inventories of used cars in the hands of both used and new car dealers, are very heavy. It is obvious that the automobile industry is affected by the same psychology of reluctance to buy that has hit other goods such as television, furniture, and textiles.

The sales slump has caused a renewal of pressure by automotive and other industries on the Federal Reserve Board to modify strict credit regulations. The automotive group is willing to stay with the 1/3 down payment required, but would like to see the time balance requirement extended to 18 or 21 months from the present 15 months.

Not all opinion about new car sales in the months ahead is gloomy, however. Most factory officials believe that when dealers realize they must work harder and "deal" as they used to do, they can move all cars shipped to them. They also point out that production now is down 12 to 15 per cent below the high levels of March because of materials restrictions, and will apparently go lower as the year progresses. Kaiser-Frazer for example, has laid off its second shift, reducing production abruptly from 800 to 900 cars a day to between 400 to 450 for an indefinite period. The company said a shortage of parts caused the cutback. Even the larger companies are running at a lower rate than in March, and there is little optimism that the trend will be anything but down for the rest of this year.

At the moment, alloy steel seems to be the most serious problem, particularly in bars, and some suppliers of

# Mews of the AUTOMOTIVE

truck axles may have to suspend or curtail operations this month or in June. Nonetheless, since the first of the year, automotive officials have thought they would be in serious trouble on materials within a short time, but have consistently managed to keep production going at a good rate. Sooner or later, of course, their forebodings are going to materialize, but just when that will happen is beyond the realm of any reasonable prediction.

### Ford Sets Up Division for Tank Production

Ford has established a tank division which will be responsible for the production of medium tanks for the Army in a new plant to be built just west of Detroit. General manager will be A<sub>1</sub> C. Moore, formerly manufacturing manager at the Tractor and Industrial Engineering Div.

#### Hupp Corp. Subsidiary to Build Tank Parts

Amgears Inc., subsidiary of Hupp Corp., has a contract to build transmission gear assemblies for tanks. The work will be done in a recently acquired plant at Detroit, and in part of the company's Chicago facilities. At peak production, schedules will be in excess of \$1 million a month.

#### Plymouth Gets Contract to Build Plane Hulls

The Chrysler Corp. has received its first major airframe contract under the defense program. Plymouth Div. will build hulls for the Grumman Albatross amphibious rescue plane in its Evansville, Ind., plant under a Navy contract. The manufacture of passenger cars at the plant will be suspended, and production normally centered there will be moved to Detroit. About one-half of the available floor space at Evansville will be required for the airframe project with other defense projects being planned for the balance of space, with the exception of a small area which will continue to produce wire harness systems for all Plymouth cars. The hull to be built measures 60 ft long, 8 ft wide, and 12 ft high, and weighs approximately 4500 lb. Procurement of jigs and fixtures has already started, and advance planning is well under way.

#### Pontiac Awarded Contract for Medium Bore Cannon

GM's Pontiac Motor Div. has been awarded a defense contract to build medium caliber cannon. The initial value of the contract is almost \$57 million, and brings Pontiac's war contract commitments to more than \$114 million. The cannon project will be centered at



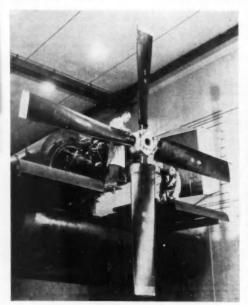
the main plant in Pontiac, and will employ about 3000 persons. The project is complex, requiring about 1800 operations using approximately 1250 machine tools at the Pontiac plant, in addition to nearly 1200 parts and assemblies, which will be furnished by 500 outside supplier companies. About 500 parts and assemblies will be produced in the Pontiac plant. Part of the machines, tools, and fixtures required will be taken from government stocks. Preproduction work is expected to take about five months.

#### United Aircraft Plans Expansion

To cost about \$20 million, and involving the construction of two new Connecticut plants, one at Bradley Field, Windsor Locks, and another at North Haven, and adding over a million sq ft of production area, a privately financed major expansion program has been disclosed by United Aircraft Corp. The Windsor Locks plant will house the complete facilities of the Hamilton Standard division, which will transfer its entire operations from East Hartford. The North Haven plant will be a satellite of the Pratt & Whitney Aircraft division's East Hartford operations and will manufacture aircraft gas-turbine engine parts.

#### Bell Helicopter Operations Shift to Texas

The Bell Aircraft Corp. has disclosed that it will transfer its helicopter manufacturing operations from the Buffalo area to Ft. Worth, Tex., where it is going to build a new \$3 million plant employing 2000 persons. President Lawrence D. Bell said that all helicopter activities will be moved to Texas, probably within a year, but that the



### TOP

This 19-ft giant turbohydramatic aircraft propeller, said to be the largest ever built for turbine engines by Hamilton Standard Div., United Aircraft Corp., is being tested by the USAF Air Materiel Command at Wright - Patterson Air Force Base. Developed under Air Force sponsorship for power plants delivering over 5000 hp, the big propeller has a double purpose: it can be used on the highest power piston engines now being considered as well is on the so-called 'medium' horsepower turbines.

### INDUSTRIES

company's defense orders insure expanding operations in the Niagara Frontier.

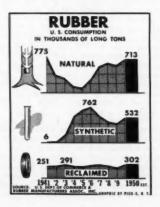
Harvey Gaylord, Bell's vice president in charge of helicopters, will head the new Texas operation. A nucleus of about 200 administrative, engineering and production personnel will be transferred there from Buffalo. The site of the new plant will be on one of the main arterial routes between Ft. Worth and Dallas. Fifty-five acres of land have been purchased and engineering and architectural contracts let for the design of the plant. First unit of the facility will have 200,000 sq ft, with provisions for future expansion. Ground will be broken and construction started as quickly as possible.

#### Borg-Warner Division to Make Shell Cases

Ingersoll Products Div. of Borg-Warner has been awarded a \$5 million contract to produce large caliber steel cartridge cases for Army Ordnance. The division is planning to build about 30,000 sq ft of additional manufacturing space for the project. Some production facilities will also be furnished by the government as part of the contract. About 100 operations are required to form the case from steel, including annealing in a controlled atmosphere furnace, and application of a varnish coating on interior and outer surfaces.

#### Convair to Build **New Plant**

Consolidated-Vultee Aircraft Corp. has announced plans to construct a manufacturing plant at Pomona, Calif., about 30 miles from Los Angeles, A 17acre site was purchased on the out-





Official Army Photo Released by Dept. of Defense

#### TWO-MAN OTTER

Called the Otter, this new development for amphibious warfare, T46E1, has been developed by Army Ordnance and will be made by GM's Pontiac Motor Div. The gasaline-driven carga vehicle can maintain a speed of 30 mph on land, carrying a two-man crew and a num-ber of fully-equipped A cross drive transmission controlled by a wobble stick, similar to the type used tanks, make the Otter exceptionally maneuverable, and it is capable of turning completely around within its own length.

be for government work.

#### **Tank Center Seeking Graduate Engineers**

The Ordnance Tank Automotive Center at Detroit has openings for 50 graduates of engineering colleges. It is looking for men from the upper third of their class who will be given an extensive training course, after which they will be placed in research and development, or other branches of the Center's large engineering department. Interested graduates may apply at the Personnel office of the Detroit Arsenal, Centerline, Mich.

#### Government Orders More Machines for Pool

The General Service Administration has placed orders for an additional \$15.2 million worth of machine tools under its "pool order" system. Previously GSA had ordered \$63.1 million worth of tools under the plan. Latest orders went to Fellows Gear Shaper Co., Morey Machinery Co., Lees-Bradner Co., and Cincinnati Gilbert Tool Co.

#### No Official Industry Reaction to CMP

There is nothing like an official reaction from the automobile industry to the announced controlled materials plan, which is to go into effect July 1st. Actually there is no solid information yet on which to base an opinion, since

skirts of Pomona. The installation will certain parts of the program are still tentative, and no firm definitive list of products that are to come under the plan has been issued. A close reading of the announcement put out by the Commerce Dept. indicates that the plan will apply only to direct defense and defense-supporting production and construction. This would appear to indicate that even though makers of civilian items, including trucks, trailers, and replacement parts, are to file their requirements, there is no definite assurance that they will be placed under the program to receive allocations of the three basic materials covered: steel, copper, and aluminum. In fact, careful analysis of the announcement shows that nowhere does it definitely state that civilian goods will receive CMP allotments. On the other hand, it states definitely that for the time being, CMP will be limited to defense production and a few special programs for production of vitally needed defensesupporting items. Essentially, the reason for filing materials requirements for the list of so-called essential civilian goods is to gage their needs in relation to the overall supply of materials.

There has been a definite division of opinion within the automobile industry about CMP. Truck producers generally, have been in favor of it, as have trailer manufacturers and parts producers. On the other hand, the larger passenger car builders have been against the program, on the basis of general opposition to government controls, and a belief that the plan will prove unworkable and eventually fall of its own weight. There is, however, a split in the passen-

# Mews of the AUTOMOTIVE

ger car industry between large and small companies, with the latter willing to accept a CMP plan, despite its draw-backs, as being more palatable than a wild scramble for materials in which they feel they would come off second best because of the greater preferential purchasing power of larger companies. A sore point with the whole industry is that passenger cars still are apparently considered of doubtful essentiality, along with such items as window shades, handbags, and artificial flowers.

#### National Automotive Fibres Awarded Defense Job

National Automotive Fibres Inc., Detroit, a large supplier of textiles to the automobile industry, has been awarded defense contracts totaling more than \$3 million. Items under order include tents, tion in Philadelphia from April 16 to 18. Among the papers presented were: "High Temperature, High Speed Grease Applications" by E. H. Erck, lubrication engineer, Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., and "Automotive Drawing Compounds Characteristics and Application" by James T. O'Reilly, supervisor, Manufacturing Research Dept., Ford Motor Co., Dearborn, Mich. An Internal Combustion Engine Panel (marine, railroad, stationary, bus, and truck—Diesel and gasoline) was also held.

#### Protests May Ease Curbs on Rubber

It now appears likely that combined pressure from the automotive and rubber industries, tire users, and Congress ger cars has been seriously affected by the ban on spare tires on new automobiles, since the extra tire is coming out of the replacement supply which already has been depleted heavily because of lowered production.

#### Shortage of Benzene Another Headache

A growing shortage of benzene is giving production officials another big headache to add to those they already have. Actual shortage figures are not available. But reliable estimates indicate that reserve stocks are going down at a rate of 1 million gallons a month. This is based on estimated current defense requirements which, added to estimated essential civilian needs, indicate that 1951 demand will be at least 252 million gallons. Supplies in sight

		REGIONAL	SALES	OF NEW	PASSENGE Two Mo			Per Cent Chan	90
Zone	Region	February 1951	January 1951	February 1950	1961	1950	Feb. over	Feb. 1950	Two Months 1951 over 198
1	New England	22,978	26,666	20,056	49,644	41,232	Jan. -13.83	+14.57	+20.40
2	Middle Atlantic	73,186	81,241	74,193	154,427	147,181	- 9.92	- 1.38	+ 4.92
3	South Atlantic	50,641 111,076	63,777	50,899 97,724	114,418 226,565	99,340 191,229	-20.60 - 3.84	- 0.51 +13.66	+15.17 +16.49
5	East South Central	18,403	24,483	21.973	42.886	43,681	-24.83	-16.25	- 1.82
6	West North Central	47,489	45,443	40.773	92,932	75,958	+4.50	+16.47 $-7.03$	+22.35
7	West South Central	41,580	51,997	44,726	93,577	81,752	-20.03	- 7.03	+14.48 +18.96
	Mountain	14,636 50,808	16,611 47,039	14,412 44,234	31,247 97,847	26,286 83,908	$^{-11.89}_{+8.01}$	+ 1.55 +14.86	+16.62
	Total United States	430.797	472.798	400.990	903.563	790.552	- 8.88	+ 5.33	+14.30

tarpaulins, and parachutes. The company is also negotiating for other defense work of a substantial volume.

### Boeing to Finance Modernization of Washington Wind Tunnel

Modernization of the University of Washington's F. K. Kirsten Aeronautical Wind Tunnel will be financed by Boeing Airplane Co., according to an announcement by Prof. Fred S. Eastman, head of the university's aeronautical engineering department, and George S. Schairer, Boeing staff engineer in charge of aerodynamics and power plants. A contract provides for an initial payment of \$20,000 to improve the tunnel and advances up to an additional \$20,000 as prepaid rent for use of the tunnel. Boeing also recently announced a \$1.5 million expansion program on its own Seattle, Wash., wind tunnel facilities.

### ASLE Holds Convention in Philadelphia

The American Society of Lubrication Engineers held their national conven-

may force the government to allocate more rubber for civilian use. Tire industry spokesmen are unanimous in their claims that the rubber stockpile is already adequate to fight a four to five year war without imports, and that more rubber must be provided for tires if a breakdown in the domestic transportation system is to be avoided. The recent spare tire ban imposed by NPA has proved a fiasco, in that about the only result is to force new car buyers to pay full retail price for the fifth tire, with no saving in total rubber consumption. The government has already hinted that its stockpiling program may be terminated in the near future. It is also apparently receptive to recommendations by the rubber industry that synthetic rubber production capacity in this country be increased by 200,000 tons annually.

A rather critical situation already exists in the supply of truck tires for replacement and for original equipment, although it is not expected that truck production will be affected because of the fire shortage. The same applies for passenger cars. However, the replacement tire supply for passenger

are now figured at possibly 240 million gallons.

This outlook is far from welcome news to automotive and other manufacturers who are becoming increasingly dependent on benzene for production of synthetic rubber, plastics for metal substitutes, nylon and other products derived from this source. The basic cause of the situation is the totally unexpected rise in chemical demand over the past decade. At the start of World War II, benzene was used mostly for motor fuel. In 1940, according to an NPA survey, about 29 per cent of total consumption was for chemical usageor about 40 million gallons out of 140 million. Chemical consumption in 1950 was upwards of 200 million gallonsout of a consumptive rate of 220 million.

The single biggest factor in the present shortage is the tight natural rubber supply which brings unusually heavy demands from the synthetic industry for styrene—biggest single user of benzene. According to the National Production Administration's figures, styrene output increased by 80 per cent last year. Styrene production is cur-

### INDUSTRIES



#### THE PULSE-JET PRIVATE

The American Helicopter Co., Inc.'s new XA-6 single-place, pulse-jet helicopter, the Buck Private, carries one man for a period of approximately 1½ hours without refueling and has an empty weight of about 200 lb. The airframe consists of a single formed aluminum tube with a small tricycle landing geor mounted at its lower extremity. The simplified two-bladed rotor and controls are mounted at the upper end of the tube. The power plant consists of one small American Helicopter Co. conical pulse-jet enaine mounted at each of the two rotor blade tips.

82 million gallons annually. Projects are under way which will increase capacity of the industry by 100,000 tons, causing the industry's requirements to rise by several million additional gallons.

#### Fred Black Heads AMA **Public Relations**

Fred L. Black, public relations director, Nash-Kelvinator Corp., has been elected chairman of the public relations committee of the Automobile Manufacturers Association. He succeeds Hugh W. Hitchcock, advertising and public relations director of Packard, who had served as chairman for the past 21/2 years.

#### K-F Reports Loss of \$13 Million

Although sales totaled more than \$238 million compared to \$104.4 million the previous year, the Kaiser-Frazer Corp., suffered a net loss in 1950 of \$13.2 million. Consequently since Kaiser-Frazer had a loss of \$30.3 million in 1949, the losses over the past two years now total more than \$43.5 million. During the first quarter of last year Kaiser-Frazer produced almost no automobiles since the plant was being retooled for new models, and it was May before production in volume was resumed. In addition, the low-priced Henry J was not put on the market until the last three months of the year. Despite its production difficulties, Kaiser - Frazer last year turned out 151,415 cars or more than 21/2 times the 1949 production of

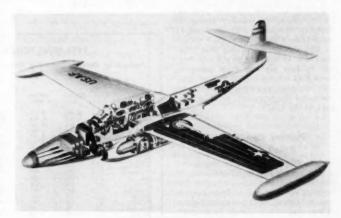
rently consuming benzene at a rate of 57,982 cars. Total assets at the end of the year were \$110.9 million compared to \$90.1 million at the end of 1949. Current assets were up to \$51.8 million from \$34.8 million, and working capital as of last December 31st stood at \$14.1 million. The company is currently tooling for a large aircraft order at the Willow Run plant, and also has contracts for the production of aircraft engines and fuselage parts.

#### Willys Three Months Sales **Totaled \$54.8 Million**

Willys-Overland Motors' sales for the three months ended March 31 were the best for any March quarter in the company's history, according to Ward M. Canaday, chairman and president. The three months total was \$54,832,322, up 28 per cent over the previous quarter and 241 per cent over the March quarter of 1950. Military vehicles accounted for less than one-fifth of the March quarter volume, and non-vehicular military sales are not scheduled to begin until fall. At that time the company plans to finish a \$7 million tooling program for jet aircraft engine components in a newly-acquired plant at Anderson, Ind.

#### Car Financing Hit By Credit Curbs

The effect of Regulation W on automobile sales is shown by Federal Reserve Board figures. The board reports that automobile installment credit declined in both January and February, with the latter month showing a drop of \$70 million. Current outstanding automobile installment credit at the end of February stood at almost \$4 billion. Automobile dealers are pointing out that any stiffening of credit regulations cannot be justified on the basis of the Board's figures.



#### PHANTOM SCORPION

The overall arrangement of the USAF's Northrop Scorpion F-89 is shown in this phantom view. The twin-jet all-weather interceptor is equiposed with airborne electronic equipment which enables it to operate by day or night and under adverse weather conditions. The Scorpion is about 53 tt long with a 56 tt wing span, and a total wing area of 606 sq ft. It has a design gross weight of more than 30,000 lb. The plane operates at speeds in the 600 mph range of stratospheric altitudes of more than 40,000 ft.

## Mans of the AUTOMOTIVE



#### FOR THE SAPPHIRE

This is a drawing of the proposed new building to be constructed by GM's Oldsmobile Div., in Lansing, Mich., where compressor and turbine units will be produced for the Sapphire J-65 jet aircraft engine. The building will have 700,000 sq ft of floor area and house 4000 employes.

#### Oldsmobile to Build Parts for Jet Engines

GM's Oldsmobile Div. has been awarded its third major defense contract. It will build the compressor and turbine unit for the J-65 jet engine for which Buick is prime contractor. Oldsmobile will put up a new building in Lansing, containing approximately 700,000 sq ft of floor area (see cut on this page), where it will machine and assemble the units. Production, however, is more than a year away.

#### Car Industry Dividends Down A Third in First Two Months

Publicly reported dividends paid out by the automobile industry during the first two months of 1951 decreased by more than a third, from \$13.7 million to \$9.3 million, from last year. Such payments by industry as a whole dropped by four per cent from last year, from \$743 million to \$713 million (publicly reported dividend payments are estimated to represent about 65 per cent of the total).

#### Pontiac Opens Model Retail Dealership

GM's Pontiac Motor Div. has opened a new and modern retail dealership in Pontiac, located on a two-acre site. The building is functional in every respect, and contains about 43,000 sq ft of space. It was designed to include every available innovation in automobile merchandising and service. Among the features are an elevated control tower for interior traffic, a complete machine shop, underground grease, gas, and oil storage, waste oil separators to prevent stream pollution, an underfloor exhaust

vent system, an inter-communication system, and a showcase-type glassed-in new car showroom.

There are 37 stalls for service customers, with the entrance to the service shop set back from the street to accommodate customers without interfering with traffic, and an additional large paved area to take care of rush periods. There are 11 two-post hoists in addition to a complete list of equipment for providing all service functions. More than a mile of fluorescent lights is used in the building, to provide adequate illumination. The control tower is linked to all major repair operations with a system of pneumatic tubes for distributing work orders and other data between the various departments.

#### Cars for British Home Market to Dip This Year

Automobiles for the British home market will be cut this year from 110,-000 to 80,000 passenger cars, while commercial vehicles will be reduced from 105,000 to 80,000, giving a total of 160,000 of all types for domestic use. This is revealed in the Government Economic Survey for 1951. Last year the actual production of British passenger cars was 113,005 for the home market and 409,510 for export. Trucks for the home market totaled 96,348, and for export 164,809.

During the first three months of this year the input into the home market was in excess of the alloted rate. The home market will now have to be starved. Whether this will result in increased exports or will determine an overall shrinkage is not stated. The Survey says "A large proportion of the capacity of the automobile industry will have to be devoted to defense production to meet the increasing demand not only for non-fighting vehicles for the services, but also for certain components for such armaments as tanks and aircraft."

Stating that there has been rapid production increase during the last few years, the Survey says "supplies of sheet steel had to be reduced in the first quarter of this year to 15 per cent below the level of the last quarter of 1950, mainly as a result of the reduction in supplies from the United States.

#### 1951 NEW TRUCK REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1951 Two Months' Totals

	February 1951	January 1951	February 1950	TWO MONTHS				
MAKE				Units		Per Cent of Total		
				1951	1950	1951	1950	
Chevrolet	28,853	29,314	24,629	56,167	47,392	33.72	33.94	
ord	19.017	20.899	19.768	39,916	37,524	23.95	26.86	
Jodge	8,572	10.730	7.236	19,302	15,541	11.58	11.13	
3. Nr. C	7.941	8.967	5.767	16,908	10,834	10.15	7.76	
nternational	7.691	8,121	6.510	15,812	12,393	9.48	8.86	
Rudebaker	2,459	3,195	3,502	5,854	6.999	3.38	8.01	
Villys Truck	1,329	1.873	772	3,002	1,616	1.80	1.16	
Vhite	1,028	1,277	681	2,303	1.314	1.38	.94	
Alack	1,001	1,006	706	2,008	1,529	1.20	1.00	
Villys Joep	710	684	568	1,394	1,160	.84	.81	
Piamond T	379	407	370	786	781	.47	.56 .34 .37	
00	363 346	397	222	760	488	.48	.34	
PLYCH	346	408	242	754	511	.45	.37	
rockway	234	267	141	501	295	.30	.21	
lutocar	147	169	128	336	241	.20	.21	
ederal	100	112	83	212	184	.13	.11	
Cenworth	76	74	18	150	50	.09	.04	
ontiac	48	88	137	134	284	.08	.21	
. W. D	50	38	24	88	64	.05	.01	
iterling	16	45	26	61	43	.04	.61	
eterbilt	25	22	*****	47	******	.03	*****	
Miscl. Domestic	180	127	118	307	293	.18	.21	
Miscl, Foreign	18	21	58	39	96	.02	.07	
Total-All Makes	78,581	88,068	71,898	106,639	130,623	100.00	100.00	

\* Based on data from R. L. Pelk & Co.

### **INDUSTRIES**

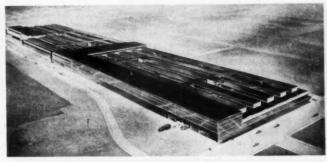
Short time working has become necessary, and home supplies are being curtailed in order to maintain exports." Used car prices are expected to rise steeply as the result of this decision. Direction of labor is considered possible.

#### New Book by Paul Hoffman, "Peace Can Be Won"

A new book entitled Peace Can Be Won, written by Paul G. Hoffman, director of the Ford Foundation, formerly administrator of the Economic Cooperation Administration, and president of the Studebaker Corp., has just been published. Drawing on his experiences, Mr. Hoffman has spelled out in clearcut fashion a program for securing the free world against Communism.

#### AMA and NADA Publish Books on Car Use

Spurred by discriminatory government actions which singled out the automobile industry for price and materials controls, the Automobile Manufacturers Association and the National Automobile Dealers Association are carrying the story of essentiality of the passenger car to the public through booklets prepared for general distribution. The AMA version is called Automobiles and National Defense and uses statistical charts, illustrations, and results of surveys to get its story across.



#### MORE FOR THE SAPPHIRE

This is a sketch of Buick's new plant, adjacent to the present Buick facility in Flint, Mich., which will house part of the manufacturing operations for the J-65 Sapphire jet engine that Buick will produce for the U.S. Air Force. The one-stary plant will contain \$80,000 sq ft of floor space.

Basis of the supporting evidence are surveys showing the extent of automobile use for essential travel by various classification of users in defense plant areas and large and small cities. It also shows the number of cities with no mass transportation systems, ownership of cars, use by occupations, registration of passenger cars by age, and much other data. The NADA publication is entitled *Do You Need Your Cars*? It points out in pictures and text that 71 per cent of the nation's families own and are dependent upon automobiles and shows how essential the automobile

is to both defense activities and the civilian economy.

#### Hergenroether Returns to NPA Metals Branch

E. J. Hergenroether of International Nickel Co., has returned to Washington as head of the Metallurgical Branch of the Steel Div. of NPA. He held a similar assignment during World War II.

#### Briggs Profit Hits New High of \$16 Million

The Briggs Mfg. Co. earned a record profit of more than \$16.5 million last year. Earnings were more than \$3 million better than in 1949. Total sales last year amounted to more than \$339.2 million.

#### Magnesium Production Increasing Rapidly

Rapid strides have been made in increasing production facilities for magnesium, and the country's position is many times stronger than it was at the beginning of World War II in that respect, according to Leland I. Doan, president of Dow Chemical Co. He said that in 1939 production was about 3350 tons, currently is nearly 25,000 tons a year, and that by the end of this year reactivation of former war plants will bring the annual rate to 125,000 tons. He also revealed that Dow is investing about \$30 million in high production magnesium mill facilities, in which 2000 lb slabs will be rolled on 84-in, coil mills. The mill will be located at Madison, Ill.

#### 1951 NEW PASSENGER CAR REGISTRATIONS\*

Arranged by Makes in Descending Order According to the 1951 Two Months' Totals

	February 1951	January 1951	February 1950	TWO MONTHS				
MAKE				Units		Per Cent of Total		
				1951	1950	1951	1950	
Chevrolet	88,810	114,523	99,270	203.333	184,157	22,50	23.30	
ord	72.056	78.562	80.801	150,618	151,486	18.67	10.17	
Plymouth	46,030	39,312	29,006	85.342	72.413	9.45	9.16	
luick	37,237	37,386	33,101	74.633	61,139	8.26	7.73	
ontiac	28,150	37,362	30.573	65.512	67,800	7.26	7.31	
lodge	26.333	23,471	17,782	48,804	41.446	5.40	5.24	
idamobile	23,195	22,469	26,593	45.664	46,165	5.05	5.84	
Aercury	20.894	22,960	20,417	43.854	37,968	4.83	4.80	
itudebaker	17,338	19,422	20,866	38.780	35,270	4.07	4.48	
hrysler	11,423	12,573	8.968	23,996	21,058	2.66	2.08	
lash	9.973	11,228	9.213	21,201	16.797	2.35	2.12	
fudson	10,025	9.334	8.942	19,359	18,101	2.14	2.29	
le Soto	9.230	9,891	6.636	19,121	15,056	2.12	1.80	
adillac	8.384	9.441	3.843	17.825	6.500	1.97	.83	
ackard	6,134	7,000	4,540	13,134	8.686	1.48	1.00	
	5,379	5.533	2,407	10.912	4.963		1.10	
	4.726	4,560	2,407		4,363	1.21	.63	
incoln	9.728		*****	9.278	*11-41	1.03	*****	
Villya	2,417	2,810	2,384	8,227	4,282	.58	.84	
ronley.	2,182	2,421	1,806	4,803	3,628	.51	.46	
	456	542	559	1,030	1,078	.11	.14	
PRINT	******	***122	395	*****	807		.10	
Iritish Austin	298	424	507	722	951	.08	.12	
Iritish Ford	247	291	70	538	143	.08	.02	
fiscl. Domestic	. 11	197	52	208	67	.02	.01	
Miscl. Foreign	1.037	1,054	277	2,091	852	.23	.07	
Total-All Makes.	430,797	472.788	408,990	903,883	790,552	100.00	100,00	

# Mews of the AUTOMOTIVE INDUSTRIES

#### Cass Heads Automotive Branch of TED

Robert Cass, assistant general sales manager of the Coach Div. of White Motor Co., has joined NPA in Washington. He is chief of the Automotive Branch, Transportation Equipment Div.

### Brazilian Airline Considers Buying Jet Planes

Panair of Brasil has under consideration the placing of an order for three De Havilland Series two Comet jet planes with Rolls Royce Avon jet engines, to be put into service in 1954. With payloads up to 14,000 lb and seating accommodation for up to 48 passengers, thes aircraft will be used on the principal trunk lines, including those across the Atlantic to Europe and the Middle East. De Havilland officials have just returned from Rio de Janeiro and have been authorized to announce the approach of a conclusion.

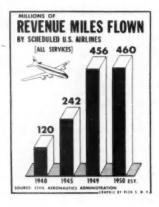
#### GM Stock Ownership Highest in History

Ownership of GM stock is more widespread today than at any time in history. During the first quarter of this year, GM shareholders totaled 456,993, the largest number on record. Holders of common stock reached a new high of 426,872 compared with 410,428, the previous record established in the fourth quarter of last year.

#### Ford Using Electronics to Test Advertising

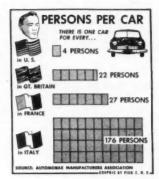
Ford is employing the psycho-galvanometer, principal component of the lie detector, for testing reaction of readers to automotive advertising. The equipment is used to record the emotional re-

action of readers to illustrations and text of advertisements, but makes no distinction between favorable and unfavorable reactions. Subjects are questioned to learn whether they like or dislike features which cause emotional change. Findings are used to recommend changes in proposed new advertising campaigns and evaluate effectiveness of advertising already published. The psycho-galvanometer operates electronically by recording changes in the electrical resistance of the skin, which occur in response to mental stimulation. A concealed observer also records eye motion of the person being tested, to find which part of the advertisement catches the reader's attention.



### Dodge Extends Option of Automatic Drive

Although other manufacturers have had to reduce production of fully-automatic transmissions, Dodge has been able to overcome production limitations of its shift-free transmission.



and is extending it to lower price models. Until recently the transmission was available only on the most expensive model—the Coronet. Currently about 80 per cent of the Coronet models carry the Gyro-Matic transmission. The transmission is now supplied on about 25 per cent of the Meadowbrook sedans and 11 per cent of the Wayfarer sedans and business coupes.

#### Hannifin Building New Plant

The construction of a new parts plant now being erected on a 17-acre site in Des Plaines, Ill., a suburb of Chicago, is announced by the Hannifin Corp. of Chicago. The modern, one-story factory building is the first of a series of buildings planned by Hannifin for this location. This initial unit will cost over \$350,000 and contain approximately 40,000 sq ft.

#### GM Employees Set New Safety Record

Along with its record earnings, employment, production, and pay rolls last year, GM also set a new record in industrial safety. The National Safety Council revealed that GM employes made the best safety and occupational health maintenance record in the company's history, despite a new all-time high of more than 465,000 employes. As a result, GM employes last year earned the Council's award of honor for safety for the seventh time. During the year 99.65 per cent of GM employes lost no time because of illness or on-the-job accidents. The accident rate was 2.12, an 18 per cent improvement over the previous record set in 1949. The severity rate was 3.86, an improvement of 10 per cent over the previous year.



#### SYNCHRO-START'S NEW PLANT

Shown here is the first completed unit of Synchro-Start Products, Inc.'s new factory, located 10 miles north and 5 miles west of the heart of Chicago's Loop, which will contain the general offices and the final assembly of Synchro-Start controls. Fabricating will remain in other plants as before until additional units are completed.

## Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Eaton Manufacturing Co. — At a recent meeting at the board of directors, C. I. Ochs was elected chairman of the board.





Eaton Manufacturing Co. - H. J. McGinn was elected president at a recent meeting at the board of directors.

Timken Roller Bearing Co .- The appointment of Paul Reeves as director of sales has been announced. Seward T. Salvage was named advertising manager and Norman H. Peterson was named assistant advertising manager.

Continental Motors Corp. - Martin Kelly, director of industrial relations in the Muskegon plants, has been elected a vice president.

Chrysler Corp.-Carl J. Snyder has been appointed operating manager.

was Edgar Washburn, vice president and general manager of American Engineering Co. of Philadelphia, a subsidiary of Hayes.

Borg-Warner Corp.-Appointment of Andrew W. Rose as assistant general manager of the Warner Gear Div. at Muncie, Ind., has been announced. Donald N. Arndt has been named assistant general sales manager of the Marvel-Schebler Products Div., and Carl R. Brick as an assistant to Roy C. Ingersoll, president of Borg-Warner

Ford Motor Co.-Andrew A. Kucher has been appointed director of the company's scientific laboratory.

Kaiser-Frazer Corp.-The appointment of J. W. Alexander as general service manager has been announced, succeeding E. N. Rickert, who has been named assistant works manager in the K-F Automotive div.



Brown & Sharpe Mfg. Co.-Henry D. Sharpe, Jr., was named president, succeeding Henry D. Sharpe who became chairman of the board.

Raybestos-Manhattan, Inc.--Election of George W. Marshall, Jr., and Alvin F. Heinsohn as vice presidents has been announced.

Piasecki Helicopter Corp.-Lee Douglas, chief engineer, has been elected by the board of directors to the newlycreated position of vice president in charge of engineering.

Fairchild Engine and Airplane Corp. -W. L. Landers has been named vice president, and general manager of the Fairchild Aircraft Div.

Square D Co .- L. W. Mercer has been elected to the new executive vice president post. F. H. Roby has been elected vice president in charge of sales and a director, and L. G. Maechtlen was elected vice president and a director.

Allegheny Ludlum Steel Corp.-Robert T. Eakin has been appointed manager of the company's Brackenridge, Pa., plant.

The Warner & Swasey Co .- Four new appointments have been announced: C. W. Bliss was elected treasurer; Irving C. Bolton was elected financial vice president; E. B. Gausby was elected secretary; and Warner Seely was elected vice president.

Seiberling Rubber Co.-Charles E. Jones, vice president and comptroller, was elected a director, succeeding J. L. Cochrun, retired executive vice presi-

Goodyear Tire & Rubber Co., Rim Div.-H. J. Lafaye has been named sales manager and W. J. Lee, assistant general manager.

Towmotor Corp.-Lester M. Sears, founder and president of the company, has recently been elevated to chairman of the board of directors.



Towmofor Corp. -Edgar Smith, executive vice president, was elected president to succeed Mr. Sears.

Packard Motor Car

Co.—The promotion of M. F. Macaulay to gen-

eral factory manager has been announced.

Packard Motor Car Co.-Three promotions have been announced: L. M. Capitani was named chief inspector in charge of all car, marine-Diesel and aircraft jet engine inspection operations; Charles R. Herrick was named traffic manager of all three major Packard manufacturing divisions; and John P. Meldrum, promoted to production control manager in charge of car, marine-Diesel and aircraft jet engine production control.

The Bullard Co .- At a recent board meeting, Frank U. Hayes, sales manager, was elected vice president.

Hayes Manufacturing Corp. - Appointment of four vice presidents has been announced: Eugene H. Glaettli, controller; Edward J. Lavalle, factory manager; and August L. Nelson, chief engineer; also named a vice president

#### Necrology

S. Duncan Black, 67, president, Black & Decker, died in Baltimore, Md., on April 15.

Lewis W. Martin, 55, general sales manager of GM's United Motors Service Div., died on April 16 in Detroit, Mich.

William A. Rose, 70, a director and retired president of the Bassick Co. (subsidiary of Stewart-Warner Corp.), died in Easton, Conn., on April 1.

T. Preston Lockwood, 59, president of the Brewster Aeronautical Corp., died in New York City on March 30.

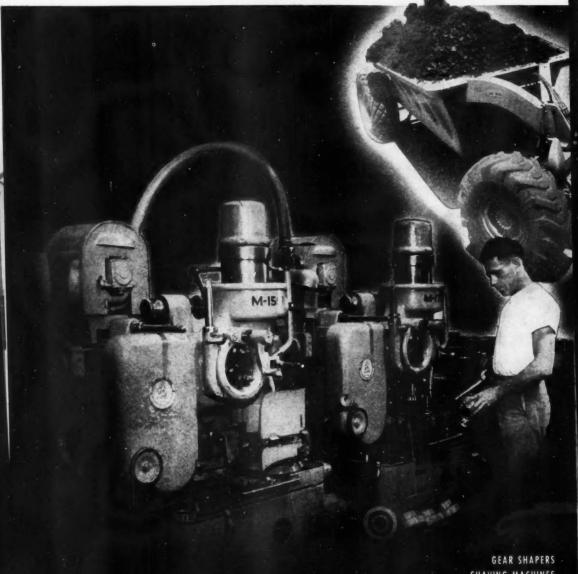
Carl W. Urban, 43, chief tool engineer at the Ford Motor Co. aircraft plant in Chicago, died in Forest Park, Ill., on April 2.

G. Robert Garside, 42, assistant director of the customer research staff, General Motors Corp., died in Washington, Mich., on April 8.

Franklin R. Hight, plant manager of the Budd Co.'s Atwater Plant, Detroit, died in Miami, Fla., on March 28.

Guy A. Moffett, recently - ap pointed assistant manager of engineering of the General Electric Co.'s Control Divisions at Schenectady, N. Y., died March 27.

### GEAR QUALITY



GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

# **HELPS SELL FOR** CATERPILLAR



REPUTATION for exceptional stand-up ability is often the extra "plus" that turns a sale in "Caterpillar's" direction. That reputation was planned for as machines were laid out on the drafting board. It is part of the planning of new units such as the DW20 Tractor and W20 Wagon pictured above. It is developed by the setting of quality standards for alloy steels, by the selection and maintenance of shop tools (including the big battery of Gear Shapers), and by rigid inspection before, during and after assembly. Fellows is proud to be able to contribute to the precision quality of critically important parts.



For latest data on the cutting. shaving and inspection of gears for light or heavy duty requirements, call on the nearest Fellows office.

THE FELLOWS GEAR SHAPER COMPANY - Head Office and Export Department, 78 River Street, Springfield, Vermont, U.S.A. Brunch Offices: 616 Fisher Bldg., Detroit 2 . 640 West Town Office Bldg., Chicage 12 . 2206 Empire State Bldg., New York L.



the reason why most people buy New Britain Automatics



With all the work there is to be done today -- can you afford to waste manpower on inefficient machines? The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES - PRECISION BORING MACHINES LUCAS NORIZONTAL BORING, DRILLING AND MILLING MACHINES





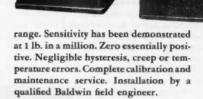
THE SEAL OF

Distinction

# Baldwin-Tate Emery Universal Testing Machines

The change in corporate name does not affect the quality, the enduring precision, of the unusual advanced features offered by these world-famous machines.

Tate Emery weighing system is entirely separate from the loading system. Servo drives provide an outside source of power, overcomes drag, provides excess energy to operate auto-controls. The multi-range system permits selection of range during test. 200 to one range or greater . . . accuracy of ½% guaranteed down to 20% of each range . . . A.S.T.M. accuracy guaranteed down to 10% of each



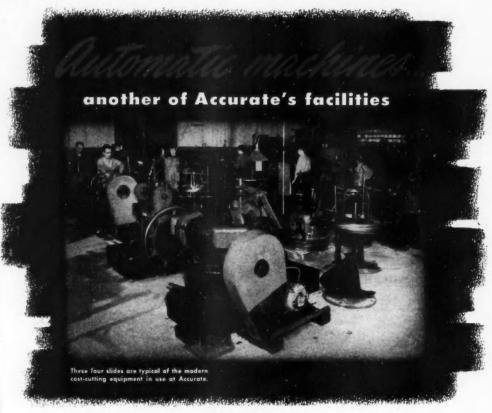


BALDWIN-LIMA-HAMILTON

**TESTING HEADQUARTERS** 

EDDYSTONE DIVISION, BALDWIN-LIMA-HAMILTON CORPORATION, PHILADELPHIA 42, PA.

In Canada: Peacock Bros., Ltd., Montreal, Quebec



# ... that lowers the overall cost of your springs

IN the battle for lower costs, the machines of your suppliers can play a vital part. Good examples are the machines illustrated above—these four slides automatically produce intricate wire forms in an almost endless variety of shapes . . . and they do it more accurately and at a fraction of the cost of previous methods.

Machines such as these are typical of the many modern technological advancements in use at Accurate to make better springs at lower cost to our customers. And behind the machines are skilled springmakers and practical, experienced

engineers who have slashed spring costs for many spring users and who would welcome the opportunity to do the same for you. The next time you need springs, be sure to find out what Accurate can do for you.

ACCURATE SPRING MFG. CO. 3810 W. Lake Street Chicago 24, Illinois

WRITE TODAY for your copy of the new revised Accurate Handbook of Technical Data on Springs, It's full of short cuts for making spring calculations.



Be sure the springs you buy are Accurate



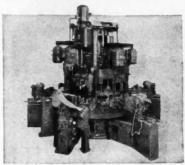
Springs Wire Forms Stampings

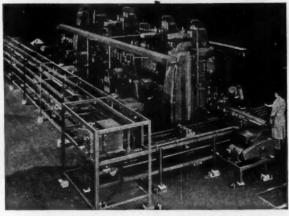
# 4 Ways

# AND REDUCE WORK HANDLING

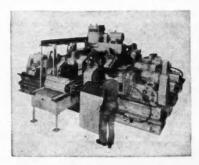
with W. F. & John Barnes Special Machines

A Special Center-Column Machine which has proved extremely adaptable to production of a wide range of parts. Standardized horizontal units are attached. Machine performs a total of 51 operations.

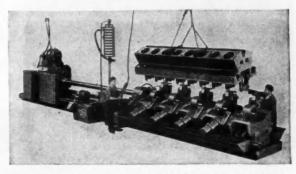




Special Progress-Thru and Return Transfer-Type Machine handles 2 workpieces simultaneously, air cleans and returns parts and work holding fixtures to operator at loading station. A total of 116 operations are performed automatically.



A Special 13-Station Progress-Thru Machine for straight line production work. Performs 61 drilling, chamfering, reaming and tapping operations on cylinder blocks. The only work handling required is the moving of the blocks on a roller conveyor in and out of the machine.



Special Single-End Boring Machine rough-and-finish-bores 9 large Diesel Engine main bearings simultaneously and straddle-faces front bearing, with only one setting of workpiece. Spindle stop and hydroulic part shifter permits advancing and retracting bar without removing bearing caps or tools.



● The W. F. & John Barnes machines shown here illustrate four different methods of combining operations to substantially reduce work handling and manual effort. Together, they show how Barnes specialized machine engineering techniques have been successfully applied to meet a range of current production needs. If you would like to know more about our complete services which have been developed over a period of 75 years, write for free booklet "Coordinated Creative Engineering."

W. F. & JOHN BARNES COMPANY, 312 SO. WATER ST. ROCKFORD, ILL.

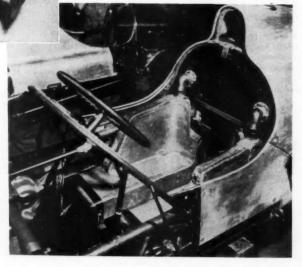
MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES - AUTOMATIC PROGRESS-THRY AND TRANSFER TYPE-MACHINES



By R. Raymond Kay

(Above) Shown here are the Goodyear aircraft spot brake and front suspension units used on two new cars built by Gordon-Schroeder. Upper arm is splined directly to torsion bor. Bar was not installed when this photo was taken.

(Right) Seat type fuel tank arrangement on Kurtis-Kraft Series 3000 cars. Main fuel tank, of synthetic rubber, is located in the tail of the car.



# of the 1951 Indianapolis Race

Higher Speeds Expected with Newly Introduced Tires and Improved Engines

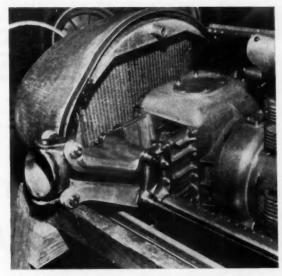
IGHER speeds—new records—are features expected at the thirty-fifth annual 500-mile racing classic at Indianapolis on Memorial Day. The racing fraternity predicts that qualifying speeds will be 131 to 132 mph, and may reach 134 mph. Some practice laps may clock as high as 140 mph.

While there are few radical engineering developments or changes in this year's entries, a newly introduced Firestone tire on all cars will give the racers three to four mph additional speed, according to company officials. The "Profile" tire, a new model of the Firestone De Luxe Champion, has improved handling characteristics and its ability to hold on the turns is said to be appreciably better than the tires formerly available.

The real contest in this year's race should develop into a "Battle of the 270's"—the four-cylinder Meyer and Drake Offenhauser. The 270 cu in. engine is installed in about 60 of the 68-70 cars competing for qualifying positions. It looks as if 30 of the 33 starters will be powered by the 270's.

The Meyer and Drake Offenhauser 270 cu in. engine which has powered the majority of cars for many years, has undergone several changes for this year's race. Improvements made by Meyer and Drake are designed to lengthen the engine life considerably. Engine operation is noticeably smoother than in previous designs.

The crankcase has been improved by adding seven lb more material to the casting to increase rigidity. The bell housing is now cast as part of the crankcase. This materially stiffens the rear section. The main bearing webs at the point where they contact the crankcase are wider by 13/16 in., which gives additional support and eliminates any tendency toward movement between these two parts. A ½ in. diameter increase in the size



Front drive installation on the new Tuffanelli and Derrico Special.

of the main bearings and a 1/16 in increase in the thickness of the crank cheeks give the engine, as a whole, additional strength.

These changes are designed to make for longer high speed operation and do not produce additional power. All of the Meyer and Drake Offenhauser 270 cu in. engines tested this year produced between 325 and 330 hp at 5000 rpm using methanol.

In this year's race, fuel injection systems will again be used on many cars. The Hilborn-Travers unit, described fully in AUTOMOTIVE INDUSTRIES, May 1, 1949, "Unique Fuel Injection System Does Not Use Timing Device," is installed in at least a half dozen entries.

A new front drive car, built by Emil Diedt, Los Angeles, has been entered as the Tuffanelli and Derrico Special. Equipped with front and rear torsion bar suspension, the car is said to be the first front drive car entered at Indianapolis to have this type of suspension. It is probably the lightest front drive car to

(Turn to page 81, please)

## Materials Handling Show

THIS editorial section of AUTOMOTIVE INDUSTRIES is keyed to the 1951 National Materials Handling Exposition and Conference which opened April 30 at the International Amphitheatre in Chicago with large attendances forecast from every state, Canada and scores of foreign countries. Presented on these and the next 12 pages are articles on important materials handling developments in the automotive and aviation industries, followed by illustrated descriptions of much of the new equipment at the exposition, which ends May 4. Over 240 companies have displays in 10 acres of exhibit space, six indoors and four outdoors, featuring materials handling equipment valued at \$10 million.

The conference sessions opened May I and are scheduled to be held three days. They feature discussions of materials handling problems of many specific industries. In addition there are demonstrations with working equipment and dramatizations with live casts. The program includes addresses by 61 top experts and at a special luncheon on May 2 Rear Admiral M. L. King, director of supply management, Munitions Board, discusses the military importance of materials handling.

# Efficient Materials Vital to Automotive



### By Joseph Geschelin

ATERIALS handling techniques in all their known ramifications have become so much a part of the production process in the automotive industries as to be inseparable components of plant layout, machinery arrangement, assembly and subassembly lines, welding operations, paint shop management, materials flow and shipment of the finished product. Today it is no longer a question whether materials handling devices are to be employed; rather it is a matter of deciding which type of equipment or combinations of such devices will give the best answer to a specific problem.

Literally hundreds of miles of conveyor lines of all kinds just in the major plants of the automotive industries attest to the economic place of materials handling. Being essentially a mass production field, available equipment and techniques have been utilized to the best advantage.

Among the postwar achievements attention is drawn to the fully automatic conveyor lines in which even the loading of parts and assemblies and transfer of such parts from the conveyor to an assembly line is accomplished virtually without manual handling. First postwar example recorded in this publication (see AUTOMOTIVE INDUSTRIES, April 1, 1947) was at Plymouth. Last year (see AUTOMOTIVE INDUSTRIES, April 1, 1950) saw the opening of the Oldsmobile Rocket assembly plant in which the car assembly lines and inspection lines not only are fully automatic in operation but are interrelated and synchronized with mathematical precision on two floors by means of electronic control.

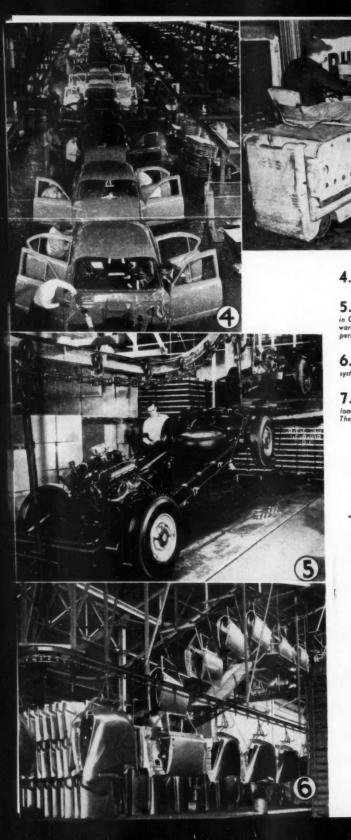
Later in the year (see AUTOMOTIVE INDUSTRIES, Nov. 1 and Dec. 1, 1950) De Soto unveiled its marvelous integrated body plant in Detroit in which the entire paint shop operation starting with the body-in-white

- 1. DeSoto bodies are delivered from the body plant to the main assembly plant on the special truck-trailer seen in this view. Bodies are loaded directly anto the trailer by means of the special body cab which rides on the craneway overhead.
- 2 Two types of materials handling conveyors at Ford are seen here. One is a monorall; the other a slat-type table conveyor. Both transport semi-mochined engine parts from the casting machine plant to the motor assembly plant.
- 3. Table-high assembly line for instrument panels at DeSata body plant.

### Handling Production







- 4. Kaiser-Frazer at Willow Run boasts something over 16 miles of conveyors of all types. Illustrated here is the 51 Kaiser trim line.
- 5 Chassis with engine installed is lowered automatically in Oldsmobile's final assembly plant. Then it is carried forward with the wheels resting on a floor-level endless belt, permitting workers to ride the conveyor as they perform assembly operations.
- 6. Studebaker door panels and trunk lids are received in treight cars, unloaded and placed on this monorail system for routing first to inspection then to body assembly lines.
- Tadding of parts by palletizing is well exemplified in this view taken at the Buick Parts Plant. Pallets are loaded and unloaded as shown by means of tark trucks. These versatile industrial trucks have a big part in materials handling systems at plants.

delivery was made fully automatic by means of automatically synchronized conveyors and dispatching stations, all stemming from a central electronic brain.

Conveyors of every conceivable type are employed not only for sub-assembly and assembly operations but for the multiplicity of feeder lines which transport parts and accessories and sheet metal from receiving or from fabrication departments to maintain assembly lines at the proper rhythm and in correct sequence. Such coordination alone has been responsible for the growth of precise scheduling of an enormous volume of product with the aid of the versatile teletypewriter and telautograph.

While conveyors aid in the delivery of parts and are a key to rhythm of production, other materials handling devices play an equally important role in reducing or eliminating manual handling. Large cranes and hoists facilitate the loading and unloading and delivery of heavy loads such as sheet steel—bandles, coils, r stock, machinery, tools and dies, etc., etc.

(Turn to page 88, please)

### Foundry Mechanization at Ford

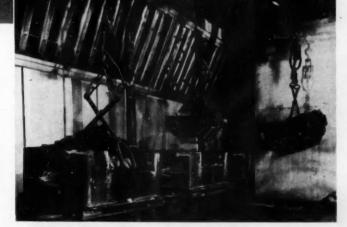
Since 1946 the Ford Motor Co. has been engaged in a vast program of mechanizing various operations through the development of modern materials handling methods. The illustrations shown here represent a sampling of mechanization of the foundry.



(Above) Pouring of cylinder black molds is done while molds are traveling on a long continuous casting line suspended from a heavy duty monorail conveyer.

(Above) Final shakeout station after shot blasting of internal surfaces. Here the castings are moved along the vibrating shakers, then are transferred to the belt conveyor at the left for transport to chipping lines.

(Right) Here is the monorail type cooling conveyor synchronized with the molding reel which removes the Y-8 block from the drag, carries it through a three-hour cooling cycle, then delivers it to the knock-out area.



# Improved Handling in New GM Vauxhall

By W. F. Bradley

Special European Correspondent for AutoMotive Industries





handling has been given the closest attention in the new attention in the new 19½ acre Vauxhall (General Motors) factory at Luton, England, which has just gone into production. This factory is the first stage in Vauxhall's fiveyear program of expansion and modernization, costing \$31 million.

The first basic principle in this plant is that the handling of individual components must be avoided. All parts are stored and moved either in standard containers or on pallets of Vauxhall design. These are in two sizes and are designed so that they can be stacked one on another. One loaded container constitutes a unit load. They are handled entirely by fork trucks for short journeys of up to 250 ft. Ten 6000 lb fork trucks lifting up to nine ft high are in operation. Eventually the number will be 20.

Certain components are handled on pallets by a special crane fork of Vauxhall design that slides under the pallet in the same way as the prongs of a fork-lift truck. It is self balancing and needs no securing, enabling supplies of these parts

(Above) Parts are fed to the transmission assembly line by overhead conveyors. Power tools are suspended above the line.

(Left) Bedford engines are run-in as they move along the assembly line. An electric motor drives each engine for 27 minutes.

### Methods Plant

to be stacked more closely together.

The second basic principle is that the distribution of individual unit loads must be avoided, whenever possible. This calls for the use of shop-tractor and trailer trains.

The stores extend for more

than a quarter of a mile down one side of the factory building, so that no component need be moved a distance greater than the width of the building. They handle 4500 separate components and in addition a basement store, 77,000 sq ft in area, is located at one end of the new building and handles "standard" parts. Every receiving area is equipped with counting scales. There is no numerical counting. Vauxhall suppliers use standard containers, so that components reach the factory already packed in unit loads.

A unique feature, and the first of its kind to be used in the United Kingdom, is a dock leveller, allowing hand trucks and fork trucks to run right into the vehicle. The weight of the fork truck is borne hydraulically by the leveller itself and the height constantly adjusts itself to that of the vehicle.

Wherever weight and frequency of traffic make it economical, overhead powerpulled conveyors are installed. Examples are gears, gear cases, gearboxes and truck bodies. When completed, shortly, all engines will be delivered by overhead conveyor to the car assembly lines in the existing factory across the road. Soon to be completed is another conveyor for delivering wheels, complete with tires, from their assembly area to the chassis assembly line.

Bedford engines are run in while on the assembly line. An electric motor is coupled up to the engine and drives it for 27 minutes while motor and engine both move along. It is then disconnected and returns automatically to the starting position. Eleven electric motors are used.

Gearbox parts are carried in overhead conveyors above the assembly line, power tools being supended above the line.

Vauxhall and Bedford production is at present 85,000 vehicles a year.

Diagrammatic Layout of Vauxball Factory.

1—Transmission machining and assembly. 2—Heat treatment department.

3—Front and rear axie machining and assembly and assembly ilnes.

5—Storage of frame components.

5—Storage of frame components.

6—Frame assembly, 7—Start of Bedford and assembly line.

8—Bedford body line.

9—Bedford cab line and paint line.

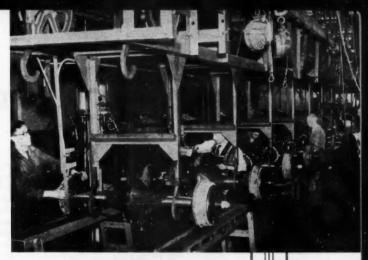
10—End of Bedford assembly line.

11—Bedford cab trim department.

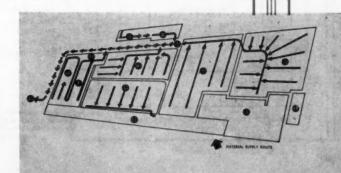
12—Vauxhall car engine machining conveyor to assembly line.

13—Stores, loading and inspection bays.

Metallurgical laboratory for heat treatment department.



Rear axles are assembled as the housing is carried along on this conveyor.



### Conveyorized Testing

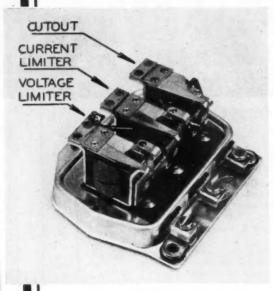
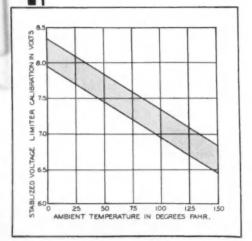


Fig. 1.—Ford generator regulator as it appears before the cover is applied. The cutout is at the right, the current limiter in the center and the voltage limiters at the left. A stiff stamped base having a beaded edge resists mechanical distortion.



REGULATORS for the generator employed in the electrical system of Ford, Lincoln and Mercury passenger cars and Ford trucks and tractors are manufactured by the Ypsilanti, Mich., plant of the Ford Motor Co. and by one outside supplier. These regulators, though produced and assembled at a high rate, are precision products and must meet exacting specifications to insure dependable performance under severe operating conditions that include vibration and exposure to dust, moisture and wide variations in temperature as well as in load.

Fig. 1 shows the assembled unit produced by Ford minus the stamped cover that is subsequently attached and fastened against a gasket to seal all interior parts against entry of dust and water. The base is a heavy stamping made so stiff that clamping to the supporting structure, where shock absorbing rubber grommets are applied, cannot cause distortion or affect the calibration and performance of the regulator.

From the following condensed summary of specifications, some indication both of the conditions to be met and of the need for careful calibration and test can be obtained. Satisfactory operation must be attained regardless of mounting position. No change in mounting can affect calibration beyond the following: Voltage limiter,

±1 per cent in voltage; current limiter, ±3 per cent in amperage; cutout closing, ±2 per cent in voltage and cutout opening ±10 per cent in amperage. The two limiters and the cutout control the field circuit of a standard Ford generator and connect or disconnect the battery from the generator at specified values of voltage and current.

At maximum rated current, the voltage drop between terminals A and B may not exceed 0.3 v. Total losses within the regulator, exclusive of the field circuit losses, may not exceed 25 watts at maximum rated load. Calibration of the voltage limiter as a function of running time and ambient temperature is measured with the generator run-

Fig. 2—Temperature compensation of the voltage limiter must be such as to keep the stabilized voltage withing the shaded area on this chart for any ambient temperature between 0 and 150 F.

### of Generator Regulators

ing at 3000 rpm and carrying a load of a fully charged three-cell storage battery of 100 amp-hr capacity plus sufficient resistance to bring total load to 10 amp, temperature being measured near the generator in air moving at 15 fps. Regulator temperature must become stabilized under these conditions in 30 minutes. At 75 F ambient temperature, the calibration should be 7.4 v. This calibration must be maintained within  $\pm 0.2$  v. (See Fig. 2.)

Average voltage during the first 15 minutes of operation must be higher than the stabilized value after 30 minutes operation but, at no time, is the voltage to exceed 8.4. Voltage limiter calibration must not vary with generator speed more than  $\pm 0.1$  v for speeds up to 9000 rpm with a 10-amp load. Regulated voltage must not fluctuate or show erratic variation greater than 0.1 v when under normal operation not close to limits of regulation.

The current limiter must limit maximum output within two amp of normal current rating under a suitable resistance load even when ambient temperature, running time or regulator position are varied.

When the generator's armature circuit voltage reaches cutout closing voltage, the cutout must connect the generator to the battery. Closing voltage must be so temperature compensated that increase in ambient temperature will not cause any increase in closing voltage.

Reverse current required to cause the cutout to open must not exceed seven amp when potential equals or exceeds the closing calibration. Potential and current characteristic must be so proportioned that the cutout will not remain closed if closed by hand or by jolting with the generator not running.

Test stands are wired as shown in Fig. 4. Calibration is continuous. If calibration is done at room temperature and remains accurate after accelerated heating described below, the regulator will follow the heat compensation curves, Figs. 2 and 3.

Checking is done at stations along a belt conveyor shown in Fig. 5 and subsequent

Fig. 4—Wiring diagram of one of the conveyorized test stands described in the text.



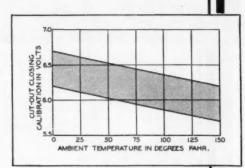


Fig. 3—Cutout closing voltage must come within the shaded area on this chart at all ambient temperatures between 0 and 150 F.

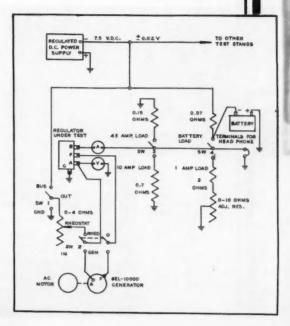


Fig. 5—At this first group of test stations on the test conveyor, the current limiter spring tension is adjusted to bring the unit into such relation that the contacts will open and close at the current values specified.

Fig. 6—Stations along the belt conveyor where three spray jets of chloroform are automatically applied for a short time to clean each of the three pairs of contacts. The hood over one station has been removed to show interior setup.

### Conveyorized

views. There are four duplicate stations for most operations. Girls sit at each side of the conveyors and remove the regulators to make readings and perform adjustments. Each regulator is passed through a small closed chamber one of which is shown with cover removed in the foreground of Fig. 6. When in position in the fixture at this station, each set of contacts is in line with a spray jet of quadruple-distilled chloroform applied momentarily and automatically. This cleans the contacts and removes any traces of oil thereon. Fumes are drawn off and exhausted outdoors.

At the first group of stations, Fig. 5, each regulator is placed in a fixture below an ammeter and the current limiter on the unit is adjusted, if necessary, by bending the adjusting arm located below the retracting spring to bring readings within limits set.

At the next station there is a fixture calibrating the voltage limiter and cutout at room temperature. A cutaway cover is placed over the unit at this station so that allowance is made for its effect on the magnetic field of the regulator, but the cover is not fastened on at this point. Switches at the operator's right

permit her to change the connections rapidly and to check about 110 regulators an hour.

After this check, a permanent steel cover with impregnated cork gasket is put implace. This seals the regulator against dust and moisture, leaving only terminals and parts below the base open. Regulators are then ready for testing at elevated temperature equivalent to that which they normally attain after 30



Fig. 7 — Closeup of regulators on the conveyor that carries them under resistance heaters in a tunnel where the inverted assembly, with cover already in place, is heated to simulate its condition of t er 30 - minute charging at 10 amp.



### Testing of Generator Regulators

minutes operation at a 10-amp battery charging rate. This heating makes it possible to test the regulators at the elevated temperature without waiting for them to attain the same temperature as a result of carrying the specified load for a much longer period.

Heating is done in a tunnel with the regulator inverted, as shown in Fig. 7 and with one terminal resting on a contact attached to the insulated base. The latter forms one element of the conveyor that advances the regulators under closed type 40-in. 1300-watt resistance strip heaters to which the input is adjusted thermostatically to cause the specified temperature rise.

Regulators pass under the heaters for one minute during which 7.3 to 7.5 volts are applied to the shunt coil. Beyond this point the potential alone is applied to maintain the natural temperature. This tunnel heating has been found to ap-

oroximate 30 minutes of operation in a car at the charging rate specified. After heating, voltage and current checks are made with each regulator mounted in vertical position under a voltmeter and ammeter at stations shown in Figs. 8 and 9. At these stations, each operator wears an ear phone in which she hears clicks when the cutout opens and closes.

Tests made in these setups are those specified above for the regulator after it is up to the temperature it attains in normal use. Regulators are subjected to these tests by operating in proper sequence the switches at each operator's right, while the

operator reads the meters and notes phone clicks. Regulators that pass these tests are accepted, and any that do not pass are adjusted, repaired and rechecked.

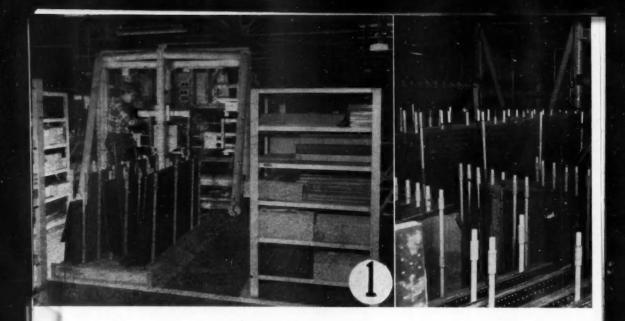
In and near the cabinets in the background of Fig. 9 are the power packs that supply current to the testing stations, and instruments for checking and recording the conditions that must be maintained. Use of the conveyorized setup effects marked economies by expediting testing.



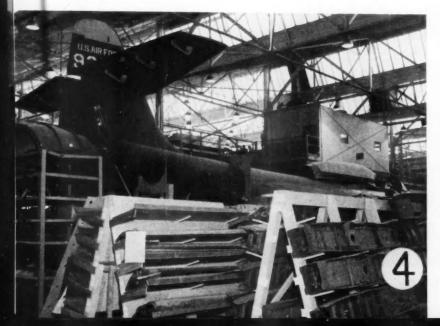
Fig. 8—Stations at which the heated regulators are given their final calibration after heating in the tunnel. If they pass this test, they are ready for use.

Fig. 9—General view of the final calibration setup at the end of the testing line. At cabinets in background are powerpacks and their controls. Clicks in earphones warn by operators tell them when the cutouts open and close.





# Double Duty Technique Cuts Aircraft Handling Costs



### 1

Components for sub-assemblies move directly from fabrication areas to using departments.

### 2

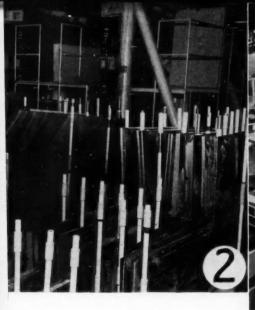
Large wing skins are stocked beside their using jigs, thus eliminating stockrooms and the attendant handling.

### 3

An overhead bridge crane is used to lith large components into jigs and fixtures. In the foreground two completed fuselage half shells have progressed on castered fixtures to the mating jig. Shown in the background are mated fuselages which progress in their holding fixtures to final assembly.

### 4

On the line stacking facilities. Parts required for installations are stocked in lacks adjacent to point of usage.





By E. R. Petoskey
Supervisor of Plant Layout & Facilities Engineering

Industrial Engineering Department,

Northrop Aircraft, Inc.

HE way to reduce handling costs is to reduce materials handling. This sounds like a misleading oversimplification, but Northrop Aircraft, Inc., of Hawthorne, Calif., has found it provides a reliable guide toward advanced handling of aircraft components and assemblies.

Materials handling costs have always been an impos-

ing factor in the overall cost of airframe manufacture. The very size of the materials handling factor requires that considerable thought and planning be devoted to developing efficient operation. At the same time, since this cost factor is a sizeable one, it offers opportunities for an equally large area of improvement.

The obstacles to minimum unit cost handling in the aircraft industry are well known. The industry necessarily experiences peaks and valleys of production. Handling equipment capable of efficient handling at peak production must also be capable of operation and maintenance at reasonable costs in slack periods. Assemblies and components to be moved seldom are regular in shape and usually require protection from shock and abrasion. Aircraft factories, with few exceptions, are constructed on a single level and are spread over extensive sites, limiting application

of conveyor belt or gravity-feed systems. Quantities, even in periods of peak production, are small in comparison with automobile practice.

When Northrop prepared to produce the Air Force's newest all-weather interceptor—the Northrop Scorpion F-89—the materials handling problems involved were analyzed in the same detail as were those of design,

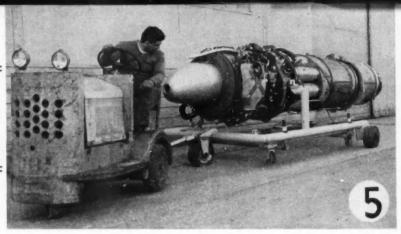
production and material supply. The Plant Layout and Facilities Engineering Department, as an agency of the Industrial Engineering division, enlisted the counsel and cooperation of all other affected departments. Representatives of engineering, tooling, inspection, production, materials and other departments of the Industrial Engineering division all con-

tributed suggestions and requirements to be met by materials handling equipment.

Experience and records acquired through mass production of Northrop Black Widow P-61 night fighters during World War II proved invaluable. However, higher performance of airplanes like the F-89, with their attendant advances in materials and methods of manufacture, had brought many changes in materials handling in the F-89 program. Refinements of previous materials handling methods were applied wherever



### Double Duty Technique



The same dolly is used for engine assembly and for towing the engine to point of installation.

possible. New methods were incorporated wherever they could be used.

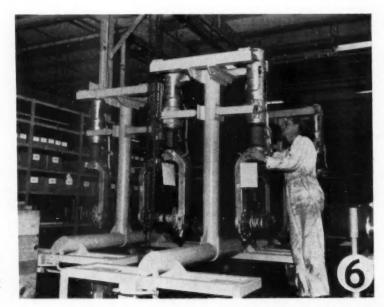
Reduction of materials handling was achieved wherever possible by elimination of transfer of components and assemblies. Analysis showed a double-duty technique could be applied to many handling problems. Equipment used to move components and assemblies also was made to serve storage or assembly functions. In-transit and intermediate transfer of parts between destinations was reduced to a minimum.

Northrop's methods of handling parts and assemblies breaks down into five principal phases:

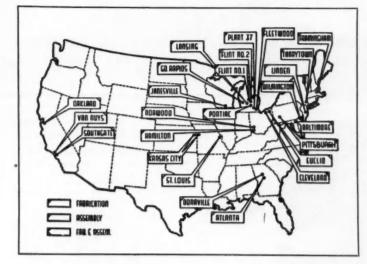
1.-Overhead bridge cranes and monorail hoist systems are installed in the final assembly areas and in sub - assembly areas where large components must be lifted and moved. Advantages of the bridge crane and monorail systems are numerous. They include maximum coverage of areas at minimum per sq ft cost; versatility that permits their use with a large range of parts and on all contracts; and low cost operation.

Disadvantages of overhead systems were not overlooked. Principal disadvantages include limitations of load capacity and production flow. Close liaison with tooling and control of facilities and plant layout within the same organization proved helpful in overcoming these features. Overhead systems also affect jig construction, since loading and unloading must be accomplished from above. Minor breakdowns of a crane system can prove costly in lost production time. Consequently, constant preventive maintenance is a must both from the standpoint of production economy and safety.

(Turn to page 72, please)



Double duty landing gear dollies provide protected storage of struts pending installation and also enable the parts to be moved easily to final assembly.



### Designing to Expedite Handling of Body Units

OORDINATION of engineering and materials handling in the Fisher Body Div. of General Motors Corp. is a must. Basically this is because of the nature of the product and the manufacturer's practices.

Fisher Body fabricates sheet steel components and sub-assemblies in seven centrally located stamping and metal assembly plants; these components and subThis map of the United States shows the varied locations of the seven fabricating and 21 assembling plants of Fisher Body Div. of GM.

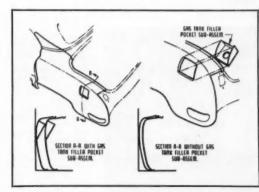
By E. R. Frost

Director of Materials Handling, Fisher Body Div., General Motors Detroit, Mich.

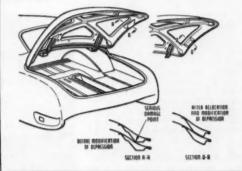
> assemblies are shipped to 21 assembly plants in the United States, and to some 16 similar plants in foreign countries, the latter operated by GM subsidiaries.

> One of the problems of body manufacture is that of handling the body parts and sub-assemblies — an important consideration in manufacturing, storage, shipping, and assembly, because of its effect on

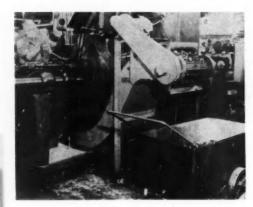
profits and losses. Components of an automobile body are large and bulky, and while inherently strong, are subject to dinging and denting of the formed surfaces. Handling is especially important from the standpoint of the storage space required and the protection that must be afforded body parts to reduce possible damage to them. This means the development (Turn to page 70, please)



Less space is required in packing when the gas tank filler packet is shipped separately.



By relocation and modification, hinge embossments on deck lids were made so that no serious damage could be caused when deck lids were stacked together.



May - Fran improved Chip - Tote conveyor having adjustable clutch and hold-down device.

Booths 329 to 336, and 703

### MH-2—Industrial Trucks and Towing Tractors

With overall exhibit space of almost 5000 sq ft the Industrial Truck Division of the Clark Equipment Co., Battle Creek, Mich., is presenting from 12 to



Clark redesigned electric Clipper fork lift

charge into tote boxes or onto a carry-off conveyor. The Chip-Tote unit provides for maximum conservation of industrial floor space, and facilitates discharge of chips, turnings or borings into standard

ported up a 60-degree incline for dis-

size tote boxes of greater height.

The special May-Fran hinged-steel conveyor belting which is utilized has an overlapping wing design on the outside pitches to confine scrap while carrying it to discharge points. Perforated steel links can be supplied to permit complete drainage of chips.

20 different pieces of equipment, among them at least three additions to its line of fork-lift trucks, industrial towing tractors and powered hand pallet trucks.

The Clark exhibit is divided into two

Booth 437

### MH-1—Machine Tool Chip Conveyor

The entire exhibit of May-Fran Engineering, Inc., Cleveland, Ohio, centers around a new improved model of their Chip-Tote conveyor, a unit which continuously removes metal chips, borings, and turnings from operating automatic or multiple-spindle production machines, and climinates periodic shutdown of equipment for scrap removal.

New provisions of this conveyor include a formed steel hold-down which meters turnings, chips, and other scrap passing up the conveyor belt. The device gradually compresses materials being conveyed into a compact, evenly distributed mass to eliminate jamming and prevent full-back of small pieces.

An adjustable clutch has been added to the power source for increased safety. If a load in excess of a pre-set limit is imposed on the conveyor belt, the clutch will slip to prevent possible damage to personnel or equipment.

An additional improvement is the increase in height of the belt cover to provide greater capacity and freer flow.

The Chip-Tote conveyor unit can be furnished in sizes to fit practically all machine tools, standard or special, and its speed of operation can be synchronized with the metal-removing capacity as well as the rate of flow of the coolant of the machine to which it is attached. Scrap material is funneled onto the conveyor belt by a hopper, carried horizontally until clear of the machine's working mechanism, and then trans-

MH-3—Pallet and Skid Racks



Booths 150 151

Permitting use of the full cube of available storage space, these pallet racks displayed by Fab-Weld Corp., Phila., Pa., are elec-trically welded structures, erected and bolted to position in user's plant. Uprights are channels; fray members structural angles, whose assembly eliminates special shapes and fittings. Skid racks of similar construction are also being displayed. Both skid and pallet racks give individual selection of unit loads, can be added to or dismantled and re-erected easily, and need not be bolted to the floor.

sections-one indoors and the other outdoors. The indoor space comprises 3400 sq ft and runs almost the entire length of the arena section of the amphitheatre. In this space are exhibited and demonstrated machines designed for indoor operations. In its outdoor space, Clark is showing and demonstrating its pneumatic-tired forklift trucks and towing tractors.

Of interest is the new powered hand pallet trucks-the Hydro-Lift, gasolinepowered with hydraulic-motor drive, and the Electro-Lift, having electric power and electric-motor drive, in both of which the motor is mounted in the

drive wheel.

A light duty towing tractor, also displayed, is described and illustrated in AUTOMOTIVE INDUSTRIES, March 1st issue, 1951-page 51.

Booth 942

### MH-4-Wire-Tyer Plus **Special Coil Carton**

Wire coils that are functionally packaged are being introduced along with a new Model D wire-tying machine put out by Inland Wire Products Co., Chicago, Ill. The special carton for the 25lb coils of tying wire both protects the wire and provides a convenient, speedy wire dispenser to the machine.

The 25-lb coils are inserted into a heavy fibre-board shipping carton the top of the 121/4 in. sq 21/2 in. deep carton being perforated for a 71/2 in. diam opening. On delivery, the perforation is easily broken, exposing the loose end of the coil which the operator draws out as needed. The wire feeds smoothly.



Inland Model D wire tying machine, wire coil, carton, and stand.

without tangling and the coil remains flat and intact.

A plated wrought iron rod, formed into a U-shaped stand is also furnished with the new Inland carton. Inserted up the back of the carton, it holds the container firmly at a convenient 45 deg angle. The carton and stand can be

placed in any desired position-on floor, on shipping table, or suspended from the wall. The stand holds the carton ¼ in. off the supporting surface, away from moisture dirt or grease.

Booths 113, 114

### MH-5—Steel Strapping Equipment

A. J. Gerrard & Co., Melrose Park, Ill., is exhibiting their complete Steelbinder and Bulkbinder lines of medium and heavy duty box strapping and carloading tools, reels, cutters, stretchers, sealers, and edge protectors as well as the complete line of accessories, all of which fully comply with present gov-ernment specifications. Of interest are demonstrations of newly developed steel strapping equipment.

men or fork trucks when the unit is not in use.

The design of a new machine-feeding lift which requires no floor-installed hydraulic power cylinder is also being

Booths 237, 238

### MH-7-Two Fork Lift Trucks

Mobilift Corp., Portland, Ore., is pre-senting two new Tier-Master Lev-R-Matic drive fork lift trucks, the sitdown model ER and the stand-up model E. both of 2000 lb capacity. Instant finger-tip control of forward-back movement, elevating and tilting are afforded by functional grouping of three easy-to-engage push-pull levers placed for right-hand operation. There are no



Globe hydraulic-powered dock leveling ramps, shown "self-leveled" in use, raised,

Booths 542, 543

### MH-6-Improved Dock Leveling Ramp

A working model of their hydraulicpowered dock leveling ramp of improved design is being demonstrated at booth of the Globe Hoist Co., Phila., Pa. The "self-leveling" dock ramp is a power-positioned hinged "gangplank" which links the loading dock with the bed of the motor truck or trailer. One end of the steel plate ramp is hinged to the dock. The other end can be raised or lowered through a short arc to line up flush with truck beds and then "ride" securely on the bed even though spring compression or expansion during loading or unloading will vary the truck height. This ramp may be installed to extend outward from the dock, or recessed into the dock area. In the latter case, the design, supported by a hydraulic power cylinder, permits the ramp to be positioned flush with the dock floor to allow free cross traffic of

gears to shift, due to engineering of a multiple-disk clutch which is instantly activated by the push-pull Lev-R-Matic drive control. Another multiple-disk



Mobilitt Model E stand-up type lift-truck with mast collapsed to 72 in. for easy entry into van. With mast extended, the trunk tiers 3 pollets high, with floor-to-fork lift-ing 117 in. Unit has a free lift of 47 in.

clutch operates the roller chain lift mechanism when engaged by a similar 2-way Lev-R-Matic control. This roller chain lift design allows full unobstructed visibility between the uprights. Engine is 3 cyl air cooled type, governed to operate at 2500 rpm. Steering is 360 deg, with a possible inner turning radius of zero.

Further reference to the Tier-Master is given in AUTOMOTIVE INDUSTRIES, February 15th issue 1951-page 95.

> bly of most swivel casters with a pro-Booth 140

jection welded structure, claimed to add greatly to the strength and swiveling efficiency of swivel casters.

The caster leg design is based on the stress dispersal qualities of a true sphere, which gives a more even distribution of the load on the caster, through the leg, into the ball races. Since the load is spread over a greater portion of the ball race the caster is able to support a greater load and at the same time retain its swiveling efficiency. The rigid casters match the swivel casters in height and load rating.

The regular duty pressed steel casters consist of swivel type series 21, single ball race, in sizes 2 in. to 6 in., and rigid type series 31, in sizes 21/2 in. to 6 in. The medium duty pressed steel casters consist of swivel type, series 23, double ball race, in sizes 4 in. to 6 in., and rigid type, series 33, in sizes 4 in. to 6 in

MH-10-New Electric

Booth 218

R&M bulldog trolley. It is constructed of high strength cast aluminum alloy with heat-treated gearing and high carbon or alloy steel ground shafts, and is equipped with precision ball bearings. Entire gear train is enclosed in an air-tight case and operates in an oil bath. Relatively light in weight, the unit is easily transported. A link type steel chain-single on JC-15 (500 lb capacity) and JC-110 (1000 lb capacity); double on JC-120 (2000 lb capacity) provides flexible lifting.

simple rope controls, the unit is de-

signed for hook suspension and is

adaptable for trolley mounting with the

For additional information regarding any of these items, please use coupon on page 64

Booth 259 MH-11—Handy Carton Truck



This 18Z carton truck is designed specifically by Wellington Machine Co., Welling-ton, Ohio, to handle the awkward heavy duty ton, One, to hande the develor neary dury carrions which are replacing wooden kegs for the shipment of small parts and screw machine products. Truck also handles tate pans, boxes, etc. "Built-in" leverage han-dles load up to 300 lb.

Booths 449, 508

### MH-12—Overhead Automatic Bridge Interlock

For moving materials from point to point, from building to building, and from floor to floor on overhead tracks suspended from ceilings the Cleveland Crane & Engineering Co., Wickliffe, Ohio, is exhibiting a new automatic bridge interlock. This makes it far easier to line up a traveling bridge with a stationary system and interlock it so that a carrier can travel from one to the other.

Also will be shown a new enclosed Tramrail Saf-Powr-Bar conductor which is an insulated safety current conductor. Along with this will be exhibited a new type of sliding shoe current collector which is stated to outlast the old wheel type collectors many times.

### MH-8—Tiering Type **Pallet Box**



Shown by the Ironbound Box and Lumber Co., Hillside, N. J., is this tiering type pallet box which is essentially a sturdy selected hardwood box with two-way or tour-way entry type pallet bottom. The four-way entry type pallet bottom. The box is reinforced with outside and inside steel corner angles bolted throughout. Side boards are easily replaced it dam-aged. Spacing of bottom boards can be varied to accommodate standard tack truck or hand pallet trucks. Positive locking of tiered boxes is obtained by design of the extended and flared corner angles at the top of the box which permits safe stacking of boxes ceiling high.

### MH-9-Swivel and Rigid **Pressed Steel Casters**

Feature of the exhibit of the Fairbanks Co., New York, N. Y., are Fairbanks pressed steel caster lines which were introduced during the past year. The pressed steel caster lines consist of swivel and matching rigid casters.

The pressed steel swivel casters have the new Lock-weld construction and leg design. The Lock-weld construction replaces the conventional king pin assem-



Fairbanks regular duty pressed steel caster, swivel type, series 23, cutaway, showing double ball race.



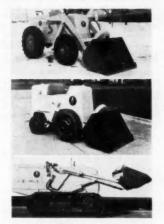
Robbins & Myers electric chain boist.

Developed as an economy unit for fast action lifting, the new Type J-C electric chain hoist, on view at booth of Robbins & Myers, Inc., Springfield, Ohio, applies modern handling methods to all types of handling operations. Available in 14, 1/2 and 1 ton capacities, the hoist finds use in stockrooms, warehouses and factories. Equipped with

#### MH-13—Three New Tractor-Shovels

The three "Payloader" tractor-shovel units illustrated are to be found in the booth of the Frank G. Hough Co., Libertyville, Ill. The Model HY 11/4 cu yd loader, in production 6 or 8 months, and gasoline or diesel engine driven, has an adjustable digging angle "bucket pitch" ranging from 1 deg to 6 deg, providing a digging depth of 61/8 in. below ground. Four speeds in both forward and reverse directions are provided. Road speed ratios range from 2.5 mph in low gear to 19.9 mph in high.

Steering is finger-tip controlled



Hough "Payloaders" Model HY, in production; Model HA, restyled and redesigned; and Model T-12, the newest.

through addition of an hydraulic steering booster. Axle, transmission, power take-off and engine are all physically separated as individually serviceable units. Accessibility to each as a separate "package" is said to result in unmatched time savings.

The Model HA 12 cu ft loader provides a new higher compression ratio engine, larger heavier duty clutch, constant mesh transmission, and greater accessibility to engine parts.

Booth 219

### MH-14-Knock-Down Materials Handling Box

The Jervis B. Webb Co., Detroit, Mich., is presenting the Hazen knockdown materials handling box having nesting features and built-in safety claimed to combine the stacking and strength features of rigid boxes with the space-saving features of collapsible boxes. Stacking features permit transportation and tiering of loaded or empty boxes in high multiple numbers; and removable sides, in various combi-

Booths 207, 209, 209 nations, permit many applications in storage use or on production line.

It is pointed out that ten empty knocked-down boxes can be stored in the same cu ft space required for only 4 assembled boxes. Four normal freight car loads of filled boxes can, when empty, be quickly disassembled and returned in one car, utilizing practically all of the car's air space and weight allowance. In addition, when shipping stacked Hazen boxes in either freight car or trailer, the nesting features eliminate need for binders or other types of strappings or blocks.

Bayonet lock and dowel pins for the side sections permit access to box contents. Boxes can form storage bins. cabinets or shelves in a permanent manner and yet permit removal by fork trucks with load intact. Because of the removable sides, the boxes can replace costly carpenter and millwright labor and materials when used as cabinets, bins or shelves. Along assembly lines heavy items can be easily loaded or unloaded into three-siders with the remaining side replaced when loaded.

This Hazen box is built in two standard dimensions-the A box, 48 in. long with 27.5 cu ft capacity; and the B box, 54 in. long with 30 cu ft capacity. All boxes are constructed of sq steel tubu-

lar frames and corrugated steel panels. Sides are said not to spring because they are secured by dowel pins which fit into the holes in the base frame. The boxes can be used as pallets, open

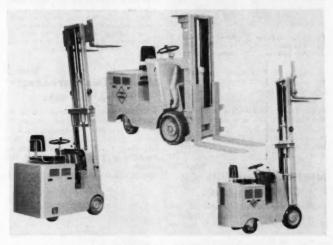


Hazen knock-down materials handling box, at booth of Jervis B. Webb Co.

side or three-side boxes, and can be doubled in depth by nesting the addition of two extra sides and two extra ends. Boxes are accessible to 8-way pickup by fork trucks, and can be procured with sides of wire mesh, canvas,

### MH-15—Three New Fork Lift Trucks

Booths 301, 302, 303



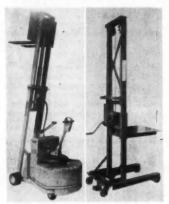
F-31-T 6000 lb cap. electric lift truck GF-30-T 4000 lb cap. gasoline lift truck. F-26-T 2000 lb cap. electric lift truck

At the booths of Elwell-Parker Electric Co. Ar he booms of Elwer-ranger Electric Co-Cleveland, Ohio, particular emphasis is placed on the new "Air-Right" series fork lift trucks, with one truck from each capacity class (2,000—4,000—6,000 lb. capacity) on display. New trucks are the F-26-T, an electric powered 2,000 lb. ca-

pacity tark lift truck; the GF-30-T, a gaso line powered 4,000 lb. capacity fork lift truck; and the F-31-T, a 6,000 lb capacity electric powered fork lift truck. All are provided with caster type trail axles, hy-draulic lifting mechanisms, and cushion Booths 519, 520, 530, 531

### MH-16—Telescopic Truck; Light-Duty Elevator

Pictured below at left is the new Hi-Lift Power Ox telescopic tilting fork lift truck with a lift of 10 ft, being displayed by Barrett-Cravens Co., Chicago, Ill. For stacking of pallet, skid and box top loads this fork type Hi-Lift is recommended for narrow quarters. Furnished in 2000, 2500, and 3000 lb capacities, its articulated drive unit permits following the contours of floors, ramps, etc., independent of stabilizing casters mounted under the counterweight. Mast tilts 2 deg forward and



Barrett Hi-Lift Power
Ox telescopic fork
lift truck.

Barrett light-duty 7ft. - lift, partable standard elevator.

10 deg back. The truck provides full 120 in. lift with 83 in. collapsed height and 60 in. free lift.

Pictured on the right is the lightduty portable standard model elevator with full 7-ft lift, new addition to the Barrett "5-Hundred" line of regular production model portable 5-ft lifts of 500 lb capacity.

Booth 726

### MH-17—Cranes With Clutch Eliminated

Coles Cranes, Inc., Chicago, Ill., has on display a gasoline electric machine of smooth operation, in which clutches have been eliminated. Limit switches on both the hoist and boom hoist motions afford safety. A safe load indicator eliminates possibility of overload. For close-quarter work a cantilever type boom is mounted on a high centrally situated A frame. Feature is the reversible steering by which, no matter what position the superstructure bears in relation to the chassis, the steering is always normal. Crane sizes range from 1% to 23 tons.



For additional information regarding any of these items, please use coupon on page 64

Booths 216, 217, 230, 231
MH-18—Automatic
Dispatch Carrier



Automatic dispatch carrier displayed at booth of the American MonoRail Co., Cleveland, Ohio, was originally designed for delivery of core sand to storage hoppers at core makers benches and core blowing mochines. The carrier consists of a standard MonoTractor for horizontal propulsion on the MonoRail tracks, a twin hook. Electro Lift hoist and a special bucket mounted so that the gear head motor can turn the bucket no complete revolution. For the Show the carrier is equipped with control devices to perform selective stopping and starting at each of four stations around the perimeter of the American ManaRail exhibit.

Booth 503

### MH-19—Two Short-Length Fork-Lift Trucks

Shorter length, shorter width and narrower turning radius feature the two modern 2000 lb capacity fork lift trucks placed on display by the Buda Co., Harvey, Ill. The two trucks are available in a 24 in. and 15 in. load

Buda's model FB20-24 and FB20-15 in-



Budo fork lift truck, Model FB20-24.

corporate a new design single gear shift lever mounted on the steering column, a full front vision instrument panel with a complete set of gages, and a 9½ in. diam clutch that is easily replaceable in 30 minutes without removing the transmission.

Models are powered with a 4 cyl, 61 cu in. displacement engine and are available in five standard masts with a lift of 72 in., 84 in., 108 in., 114 in., and 120 in.

Booth 702

### MH-20—Hydraulic Crane and Boom

A new hydraulic crane with telescopic boom, on exhibit for the first time by Austin-Western Co., Aurora, Ill., has been designed to combine the best features found in crawler, truck and erec-



Austin-Western hydraulic crane, boom extended.

tion cranes with those found in industrial shop cranes.

When swinging, the boom can be revolved in a full circle continuously. When traveling, the load is not subject to uncontrolled swinging. When placing the load, the operator is not obliged to keep moving the vehicle; the four hydraulic movements of the boom and cable hook enable him to precisely spot the load without leaving his seat. With hydraulic control when the valve is opened, the load moves; when the valve is closed, the load is locked in position,

or can be moved 1/6 in. at a time in any direction with short, rapid valve move-

The boom is rotatable through 360 deg by means of a hydraulic oil motor. The boom is raised and lowered hydraulically by a large diam vertical cylinder, connecting the base of the turntable and the underside of the boom shipper shaft. The boom can be raised from a horizontal position to an inclined angle of approximately 45 deg. In addition to the up and down angular movement of the boom, the outer end of the boom can be extended or retracted a distance of 8 ft by means of another hydraulic cylinder mounted inside the boom. Raising and lowering of the cable hook is also hydraulically controlled, and is accomplished by use of a vane-type hydraulic motor.

With boom horizontal, capacity is 4000 lbs at 16-ft radius; 8000 lbs at 8-ft radius. Over-all length with boom retracted is 14 ft 9 in. Over-all width is approximately 8 ft. Over-all height (door clearance) is 93 in. Lifting height (hook to ground with boom raised and extended) is approximately 18 ft. Maximum drop below ground (boom horizontal and cable fully extended) is approximately 13 ft. Gross weight is approximately 17,000 lbs.

Booths 445, 504

### MH-21—Tiering and Pallet Trucks; Elevating Tables

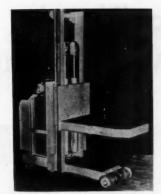
Emphasis at booth of the Lyon-Raymond Corp., Greene, N. Y., is placed on the company's new SpaceMaker electric tiering truck. Several models are displayed and actual working operations demonstrate their maneuverability with pallet and skid loads in narrow aisles.

Supplementing the SpaceMaker, Lyon-Raymond is demonstrating their streamlined 2000 lb capacity hand pallet trucks. The trucks are now offered with an improved design pump as well as brake, which is a standard feature.

Several styles of hydraulic elevating tables are shown including the 2000 lb capacity units with 16 in. and 22 in. ranges of elevation. Hydraulic sheet feeding tables in new designs have



Lyon-Raymand tilt top hydraulic elevating table for feeding strips into inclined bed



Lyon-Raymond 4000 lb capacity Space-Maker tiering truck for handling skids in narrow aisles.

lower minimum heights and greater ranges of elevation. Power and foot operated elevating pumps are displayed on the sheet feeding tables.

Booth 447

### MH-22—Electric Chain



To be exhibited by David Round & Son, Cleveland, Ohio, this new lightweight electric chain hoist, the Rocket "51", provides a V-belt driven cam-actuated gear mechanism with a 10½ to 1 ratio that develops a hoisting efficiency of 95.6 per cent. The V-belt drive design is reported to be a new development in chain hoist construction by which power is transmitted to the load wheel with less frictional loss than in a gear assembly and at a saving in cost. Weight of the Rocket "51" is 79 lbs and its headroom is 14 in. Current models are being built in 500 lb and 1000 (20/440 V, 3 phase, 60 cycle motors. Lifting speeds available will be 17, 21, 24 and 34 fpm.

### MH-23—Four Materials Handling Units

In operation at the display of Manning, Maxwell & Moore, Inc., Muskegon, Mich., are a new series 700 "Load Lifter" electric hoist, a "Budgit" portable electric hoist, a "Budgit" aluminum chain block with link chain, and a new "Tugit" lever operated hoist.

In addition, there are displayed photographs of all other items in the "Budgit" line of products, and photographs of the various types of "Load Lifter" hoists and "Load Lifter" cranes.

Booth 140

### MH-24—Skid and Box Top Tiering Units

Skid and box top tiering units with unlimited flexibility are featured at booth of the Ironbound Box & Lumber Co., Hillside, N. J.

The units are stenciled A and B. The A type box is built with extended and flanged corners both top and bottom to fit over the skid corners, and will also hold B type boxes. The B type boxes are used to increase box capacity to any depth required and are built to stack on top of each other.

Both A and B boxes have four sides only, the bottom being formed by the skid. Skid legs fit inside the extended upper flange of the A or B box so that stacking one made-up unit upon another is only limited by the lift truck fork extension. Units can be handled by platform-lift or fork-lift trucks.

The units are of all bolted construction to permit replacement of damaged sections. Corner angles are used on the inside as added reinforcement. Hardwood is used throughout.

(Turn to page 102, please)



Ironbound skid and box top tiering units.

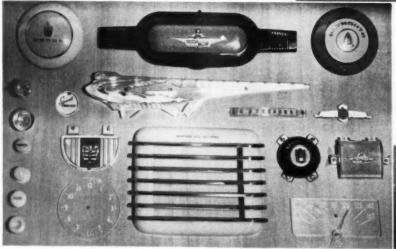
# Decorating Plastic Parts by Metallizing

LASTICS are used for many small parts throughout the interior of passenger cars and for a few exterior pieces such as parking light lenses and tail lights. Interior parts include steering wheels, various knobs and buttons on the instrument panel, ash trays, and name plates. The decorative possibilities of colorful

plastics have been picked up by the stylists particularly, and their sales value has been verified in the field.

A process utilizing the decorative possibilities of the clear plastics more fully while holding down costs has been taken up by the automobile industry so generally that at present every standard make of car uses parts made by this (Turn to page 84, please)





Metallized plastic parts made by Electric Auto-Life Co.



### **METALS**

### Tungsten Now Nearly Three Times Price at Start of Korean War; Mexican Ore Miners Threaten to Strike

By William F. Boericke

### **British Advance Metal Prices**

Of considerable significance last month was the action of the British Ministry of Supply in advancing its selling price for copper, lead and zinc delivered to British consumers. This had more than local importance. It was frank recognition by this agency that buys and sells Britain's entire metal supply that U. S. metal prices, upon which British prices had been based, were out of line with the world market. To secure a supply in competition with Continental buyers the bids would have to be raised.

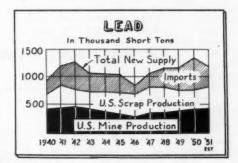
Accordingly on April 3 the copper price was increased to 26½ cents a pound, lead was boosted three cents to 20 cents, and zinc 2½ cents to the same figure. This action may forecast a similar movement by our own Government. While Great Britain is almost wholly dependent upon imports for its metal supply in contrast with the United States which can furnish much of its metal needs from its own domestic mines, under present abnormal demand nearly 25 per cent of our copper and about 40 per cent of its lead and zinc requirements must be imported. Obviously the higher foreign price must be paid if these metals are to be purchased on a competitive basis.

It seems fairly apparent now that individual ceilings on metal prices will soon be in order and that the general price freeze is on the way out. The first step along this line was taken when OPS issued a directive fixing \$65 per short ton unit for the price of domestically produced tungsten. This price, nearly three times

that prevailing at the time hostilities began in Korea, was expressly designed to encourage domestic production of tungsten ore of which this country has only a limited supply. The Government has also guaranteed that its purchasing basis will not drop below \$63 for the next five years. Other metals will have their own specific ceiling prices according to the chief of the metals branch of OPS. These will include copper and copper scrap, nickel and nickel scrap, aluminum and several ferro alloys.

### Zinc Demand Continues Strong

March statistics for the zinc industry show that shipments of slab totaled 80,462 tons, slightly more than for January. Domestic consumers took the same



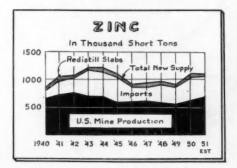
tonnage as in January. Stocks on hand on March 31 were virtually unchanged from a month earlier. Unfilled orders were higher at 80,769 tons.

The threatened strike of Mexican miners will cut into imports of zinc, but will especially affect ore supply for zinc smelters. Mexico supplies 55 per cent of all imports of zinc concentrates to this country.

Freight increases will cause an advance of four per cent in the price of Prime Western zinc, which is sold on East St. Louis basis. Producers of Special High Grade must absorb the increase, as it is sold on a delivered basis.

Indicative of its strong position, in the export field ordinary zinc was offered nominally at 27 cents a pound, 10 cents more than the official price.

(Turn to page 90, please)



# USAF Decentralizes Supply Setup

RAMEWORK of the farflung supply and maintenance system of the Air Materiel Command, USAF, has been geared to cope with the accelerated pace of the national emergency and the technical growth and armed power of the Air Force by adopting a new concept in the distribution of supplies. Several special functions, such as distribution, which previously had been performed by Supply Division Headquarters, AMC, Wright-Patterson Air Force Base, Dayton, Ohio, have been decentralized to various field organizations. This relieves headquarters of many supply operational duties. World-wide supply and maintenance operations of the Air Force, however, are still directed from Headquarters, AMC.

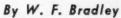
Under the present system, supplies are shipped from the manufacturer directly to a zonal depot, and from there directly to the individual Air Force base. Previously, specialized depots throughout the United States were stocked with a particular property commodity, and that commodity then was distributed to all depots. In effect, this made every depot a general depot, and meant that materials had to be shipped from the manufacturer to the specialized depot; then to the general depot, and finally to the Air Force base.

Under the concept in the new system, continental United States is divided into two zones. Each zone has a complete stock of all classes of Air Force preperty, divided between them on an equitable basis, using airplane population, vehicle population, or troop strength, as its applicable for the basis of computation. The zones are separated by the Mississippi River and the eastern boundaries of Illinois and Wisconsin.

States in each zone are grouped into Air Materiel Areas. Within each area there is a headquarters established at an Air Force depot which provides supply and maintenance technical assistance to all Air Force (Turn to page 76, please)



### Renault in Production on New Frigate Model



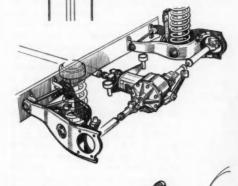
Special European Correspondent for Automotive Industries PARIS, FRANCE
DETAILS of construction of its new Frigate model
have been released by the French Governmentowned Renault company, together with an announcement that deliveries will commence next
October. Production, estimated at 250 units per
day, will be in a new factory a few miles to the
west of Paris. This larger model will not alter the
production program of the small four passenger,
45 cu in. rear engine model, which is now being
turned out at the rate of 410 per day.

With the Frigate Renault is entering the bigger car class, as it provides for six passengers on a wheelbase of 110 in., with a tread of 55 in. Internal body width is 56 in. at the front and 53 in. at the rear seats. Weight has been held down to 2420 lb.

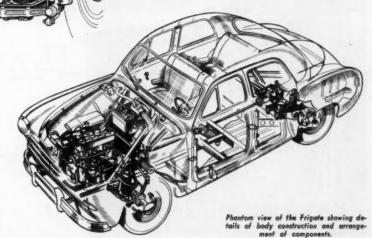
Maximum speed claimed is 80 mph.

Although the engine is in front and drive is to the rear wheels, the design is a complete breakaway from anything yet produced by Renault. Frameless construction has been adopted, the body being a one-piece sheet steel welded structure with an average thickness of about 0.04 in. It has stiffened rails on which the engine is mounted and two pressed steel cross members, the rear one being below the

(Turn to page 78, please)



The above sketches illustrate arrangement of differential housing, drive shafts, and rear springs (upper) and front suspension details (lower).



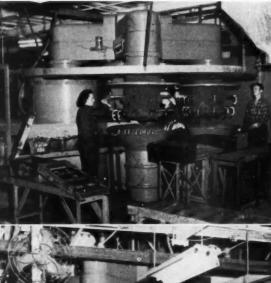
## Improved Finishing Machine for Zinc Base Die Castings

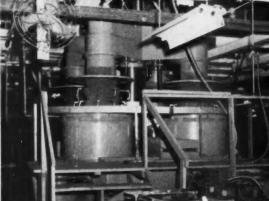
In the January 1 issue of Automotive Industries information was given concerning a unique method of mechanically finishing zinc base die castings preparatory to plating, developed by the Ternstedt Div. of General Motors Corp.

More recently, Ternstedt placed in operation a faster, more versatile mechanical finishing machine that was developed and built by the Process Development Section of General Motors. This new machine, called a Gyro-finisher, is massive in construction and requires considerable electrical motor capacity to run. It has four large heads and four operating positions. In the first position a given head is loaded with parts to be finished. When the automatically controlled dwell period has expired, the upper structure bearing the four heads is hydraulically raised, turned 90 deg,

and lowered. The loaded head is thus moved to the second position and is then within the first of two continuously rotating tubs. The next indexing movement places it within the second tub. The third brings it to the unloading station while the fourth returns it to its starting position. In some cases, both loading and unloading are accomplished at the first position. Not quite two minutes time is required for the complete cycle, which is fully automatic save for loading and unloading.

The polishing tubs, one of which rotates clockwise, the other counter-clockwise, are charged with a comparatively dry abrasive mixture which leaves finished parts relatively clean.





Upper illustration shows the front or loading stetion of the Ternstedt polishing machine. Parts are placed on the fixture in the form of a "tree" as shown, and are removed by the operators at the completion of the work cycle.



At the left can be seen the rear of the machine shows the two polishing stations. It may be noted that the two heads are elevated from the loading position to clear the large tubs, then lowered into working position.

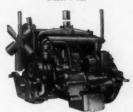


# SOME Jamous ENGINES EQUIPPED WITH SCHWITZER-CUMMINS SUPERCHARGERS

Model 687-C—Pauling and Harnischfeger 6 cylinder, 2 cycle using two S-C



Model D-397—Caterpillar Industrial
Diesel V-12.



Model D-337—6 cylinder— Caterpillar Diesel.



Model D-375—Caterpillar Diesel V8.



Model HR8S-400—Cummins Engine Company, Inc. (Used also on H8S Series)

More than twenty-five years of research, intensive engineering, wide field experience and unexcelled manufacturing facilities are back of our product.

Its excellent service record in tens of thousands of applications under the most severe operating conditions has established Schwitzer-Cummins superchargers as a product of supreme reliability and efficiency.

We build superchargers for trucks, busses, earth-moving equipment, power plants, submarines, in fact for all uses up to 800 hp.

We can offer the last word in engineering assistance and the ability to produce efficiently.



Model 487-C—Pauling and Harnischfeger 4 cylinder, 2 cycle.

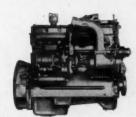


Model NHRBS-600—Cummins Engine Company, Inc (Used also on NHS-NHBRS-NHBRS.)

### SCHWITZER-CUMMINS

Supercharges Engines for

MACK-INTERNATIONAL, INGERSOLL-RAND AND OTHERS



Model JBS-400—Cummins Engine Company, Inc. New High Speed Engine.

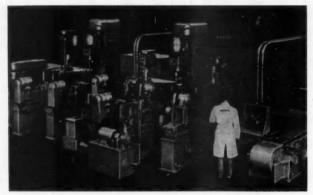
### Other Schwitzer-Cummins Products

- OIL PUMPS WATER PUMPS COOLING FANS
- VIBRATION DAMPERS AUTOMATIC SHAFT SEALS

SUPERCHARGER SPECIALISTS FOR OVER 25 YEARS

SCHWITZER-CUMMINS COMPANY

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 64



Cross special machine for milling, drilling, boring, reaming, chamfering and tapping clutch housings.

### **B-62—Special Machine** For Clutch Housings

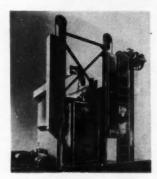
Recently designed and built by the Cross Co., Detroit, Mich., is a special machine tool which mills, drills, bores, reams, chamfers and taps clutch housings at the rate of 94 pieces per hr at 100 per cent efficiency. Only two unskilled operators are required - one loads and presses the starting button, the other unloads the completed housing.

The machine is a Transfer-matic-Cross' name for its line of machine tools equipped with automatic transfer mechanisms for moving parts from station to station. Palletized work fixtures hold the housings during the transferring from one end of the machine to the other. An integral conveyor automatically returns the pallets from the unloading to the loading station. The work is done at nine stations-one for loading, seven for cutting and one for unloading. Chips are automatically removed by a special built-in conveyor.

The machine is composed of standard Cross units to facilitate maintenance and provide flexibility for part design changes. Other features include hardened and ground ways, hydraulic feeds and automatic lubrication with each machine cycle.

### B-63-Abrasive Drum **Cleaning Machines**

Two Rotoblast drum cleaning machines, Models ES-400 and ES-382, (Turn to page 62, please)



Pangborn Rotoblast drum cleaning m chine, in Models ES-400 and ES-382.

### The Machine Tool Bottleneck

RAILURE of Washington mobilization were Westinghouse men and a large the loss of nearly a year for expansion officials to recognize the materials needs of machine tool builders has limited the production of the industry to an almost constant output since September of last year, Tell Berna, general manager of the National Machine Tool Builders' Association, emphasized in addressing the Westinghouse Machine Tool Electrification Forum last month at Pittsburgh.

The affair on April 10 and 11 was the 15th annual forum sponsored by Westinghouse and proved to be one of the largest and most successful. The attendance reached the 320 mark with 129 companies represented, including 215 executives and engineers from machine tool companies. The remainder

group of industrial magazine editors.

Due to an avalanche of machine tool orders, Mr. Berna pointed out, the backlog of the industry is now 22 months, as compared to the World War II period when the backlog never exceeded seven months. Despite the machine tool industry being essential for equipping defense plants, up to the present time it has had no more standing in buying materials than the manufacturers of roller skates and baby carriages. In addition, he declared, machine tool builders have been handicapped by price controls and the lack of a Government policy to aid them in financing required plant and equipment expansion for defense, which has resulted in

of the machine tool industry.

How machine tool builders can conserve manpower and materials was discussed by M. S. Curtis, director of engineering, The Warner & Swasey Co. For a materials program he suggested that machine tool companies examine the application of steel in their products for reduction of kinds and sizes of steel, that plain bearings can be used in some instances instead of anti-friction bearings, and that aluminum can be replaced in most of its few applications in machine tools. Abolishing the JIC Standards during the period of the Emergency was advocated to permit further conservation of materials. On

(Turn to page 96 please)

Speaking of Preference . . . 21 of 25
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The application of solid chrome plating to piston rings, perfected by Perfect Circle, more than doubles the life of pistons, rings and cylinders. Performance data will be furnished upon request.

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### • PRODUCTION • EQUIPMENT • PLANT •

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which simplify and speed-up the removal of dirt, rust, paint and other foreign materials from 30 and 55 gal returnable steel drums and lids before reuse, are announced by Pangborn Corp., Hagerstown, Md.

Metal abrasive, hurled against both the interior and exterior surfaces of the drum by centrifugal force, scours the metal in seconds, leaving no chemicals or alkalies to wash off, and providing a clean bonding surface for repainting. Drums are automatically handled during the cleaning operation—only one man is required to load and unload the barrels.

Model ES-400 is designed to clean 1000 to 1100 drums and drum heads a day, or 125 to 140 per hr. Model ES-382 will clean 320 to 560 drums and covers per day, or 40 to 70 per hr.

Both Rotoblast machines clean on the same principle. Metallic abrasive is thrown against the surfaces by the Rotoblast vaned wheels, which revolve at 2300 rpm. The cleaning cycle takes from 50 to 90 seconds depending upon the nature of the material to be removed, and the facility with which the operator loads and unloads the drums.

Drums are handled differently by the two machines during the cleaning operation. The larger capacity Model, ES-400, consists of a table divided by a partition. On either side of the partition are holders for the drums to be cleaned. While one drum is being cleaned in the cabinet, the other is exposed for unloading the cleaned barrel and loading the next drum to be cleaned.

The smaller machine, Model ES-382, consists of a cabinet, inside of which are a table and rollers. The operator places a drum on the table, and the drum cover is placed on rollers provided. He closes the door and pushes the starting button. The cleaning proceeds automatically while the operator brings up the next drum for cleaning.

Spent abrasive, mixed with the material it has secured from the drum, is cleaned of all dirt and broken particles by a separator and returned to the machine for reuse. To prevent possibility of accidents, automatic shut-off valves on both machines prevent any flow of abrasive when partitions or doors are open.

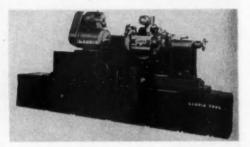
the Landis Tool Co., Waynesboro, Pa., is available in sizes to swing 30 in., 36 in. and 48 in. diam work. Lengths between centers are 48 in., 72 in., 96 in. and 120 in.

Parts such as turbine shafts, large diam motor armatures, large water valves, track carriers, and similar parts are said to be ideal for this type precision grinding machine. They are being used in manufacturing and reconditioning all diameters of jet engine rotors.

The Type CHW is a fully universal precision grinder with built-in provision for swivelling the wheelbase, head-stock and work table. Wheelbase travel permits grinding a full range of diameters from zero to maximum capacity.

An 18 in, diam grinding wheel with a 2 in, face is standard equipment. The grinding wheel spindle runs in Microsphere bearings. These bearings operate a very small clearance between spindle and bearing thereby giving a very short spark out period and quick

Landis universal grinder, Type CHW.



### B-65—Universal Grinder

A Type CHW universal grinder for large diam work pieces, developed by

accurate response to wheel feed. They are one piece steel bearings with babbitt lining and are adjustable for clearance. A grinding wheel may also be carried on the right-hand end of the spindle. An internal grinding fixture may be attached to the front of the wheelbase. This internal spindle is driven direct from the 7½ hp wheel drive motor.

Work speeds are infinitely adjustable from 8 to 96 rpm. A 3 hp D.C. motor is used for the work drive. Headstock may be swivelled 90 deg for face grinding operations.

Dual controls are available so that the machine may be operated either from the front or from the rear, depending on the shape of the work piece, as when grinding large diam work.

Carriage ways are extra wide to provide stability when grinding large diam work for which this machine is designed. The hydraulic traverse is adjustable between 3 and 130 ipm speed. The swivel table is adjustable for grinding tapered work pieces.

This machine is also available as a plain grinder for single purpose high production operations.

### B-64—Five Head Surface Grinder



Five head ratary automatic surface grinder No. 100C, just completed by Mattison Machine Works, Rockford, III., finishes the

sides of connecting rods and connecting rod caps. Work pieces are held in automatic clamping fixtures as shown. One revolution of the table under the grinding heads finishes one side. Each of the two parts are then turned over into the next fixture station. for grinding the other side. Automatic sizers are constantly in operation checking the work and keeping all pieces within specified tolerances, without operator's attention.





Plain nuts with lock washers loosened after only ONE HOUR of 4000-cycle-per-minute operation on the vibrator of a concrete block machine at the plant of the Bethayres Concrete Block Co., Bethayres, Pa.

When FLEXLOC Self-Locking Nuts were installed, they were still tight when the machine was torn down for rebuilding after 6 weeks operation—at 4000 C.P.M., 17 hours a day, 7 days a week!

So if you have an application where plain nuts might or actually do loosen and back off, try FLEXLOC, the one-piece, all-metal STOP-and LOCK-NUT "that won't work loose."

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### Publications\_

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### A-113 Materials Handling Equipment

Yale & Towne Manufacturing Co.— A new comprehensive catalog of materials handling equipment has been released by the company's Philadelphia Div. Subjects covered include a general description and application data on gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists.

#### A-114 Machine Tools

Amertool Services, Inc.—Made up of some 15 U. S. companies for the purpose of selling machine tools to Central and South America, the organization has published an 84-page book written in Spanish. It illustrates, describes, and gives specifications of the various machine tools produced by members of Amertool Services Inc. It is interesting to note that the specifications are given in the metric system.

### A-115 Hydraulic Equipment

Vickers Inc.—M-5100, a new catalog, "Vickers Hydraulics for Mobile Equipment," gives specifications, charts and design details for oil hydraulic power packs, pumps, new series multiple unit valves, steering boosters and motors.

### A-116 Packaging Materials

H. P. Smith Paper Co.—A new catalog shows specification barrier materials for use in government packaging to meet JAN (Joint Army Navy) B-121 and JAN P-117 specifications. The catalog contains actual samples of each grade, accompanied by test data and characteristics.

#### A-117 Hydraulic Presses

R. D. Wood Co.—Recently issued is a 32-page booklet designed to give an informative picture of some of the firm's facilities, methods, and equipment, particularly as they relate to

the manufacture of hydraulic presses, valves, and allied equipment.

#### A-118 Aircraft Steels

Joseph T. Ryerson & Son, Inc.—A new 68-page booklet on aircraft steels including a condensed listing of the essential features of the new Military (MIL) Aeronautical Specifications, has just been published.

### A-119 Cylindrical Grinders

Norton Co.—Recently put out by the firm is a four-page pamphlet that describes and illustrates their six and 10 in. semiautomatic, type CTU cylindrical grinders.

#### A-120 Valves

Ross Operating Valve Co.—An illustrated bulletin on a new safety valve is now available. The bulletin, Ross No. 304, includes a cross sectional view and installation data.

#### A-121 Lathes

Cincinnati Lathe and Tool Co.—A new fully-illustrated 24-page catalog No. T-101 on light-duty Tray-Top lathes, covering engine, tool room and gap bed models, has just been published.

#### A-122 Plastics

Rogers Corp.—Current information on the Duroids, a group of fibrous sheet (Turn to page 86, please)



THIS TIME SAYER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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# PRODUCTS =

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#### C-102—Prefab'd Pallet and Skid Racks



Convenience in warehouse storage is afforded by use of the new tiering-type pre-tabricated pallet and skid racks produced by American Metal Products Co., Detroit, Mich. Design enables easy tiering of stock for quick filling of orders, allowing shorter assembly lines and faster handling. Design, as shown, permits the horizontal and upright frames to be put together in a pressed fit assembly, without any bolting or welding.

### C-103-"Necked-In" Top **New Type Drums**

A new type steel drum, designed to save warehouse space, speed handling, and cut transportation costs, has been demonstrated by the Shell Oil Co., Dayton, Ohio. Considered one of the few basic innovations in petroleum distribution in many years, the new drum is slightly taller and slimmer than the standard type now in use. Its "tailor-made" dimensions permit it to be loaded four-abreast, doubledecked in the average truck trailer, and five-abreast, double-decked in box cars-thus saving considerable space over present-type drums. Similar saving is also made in warehouse space.

A feature is the "necked-in" head, about two inches smaller in diam than the rest of the drum, permitting stacking directly on top of each other, the necked-in top of the lower drum fitting inside the bottom rim of the drum

The new dimension of the drum and its necked-in design point to elimination of pallets in shipping or storing. Present practice is to carry

a pallet-load of old-type drums to the C-105-Rigid Plastic tail-gate of a van or the door of a box-car and then set the drums in individually by hand. The new-type drums, however, can be lifted, twohigh, by modified fork-truck, and set directly into the car without individual handling. Besides speeding handling and eliminating the original cost of the pallets, the new method saves freight charges for shipping and returning the pallets.

### C-104—Space Saving Oscilloscope



In production at the Simpson Electric Co. of Chicago is a new type oscilloscope, the Model 476 Mirroscope, designed to save space on the testing bench. By use of the Mirroscope principle, the 5-in. cathode ray tube is mounted in a vertical position, this construction reducing bench requirements to an area of only 9 in. by 8 in. The cathode ray image is reflected from a high grade mirror mounted in the adjustable cover at the top of the cabinet. Thus the viewing surface is brought near the eye level when the instrument is used on benches of normal height. Mirror and wing sides at top—for deflecting light— fold into the cabinet when it is not in use.

### **Polyvinyl Resin**

A new, high molecular weight polyvinyl resin that can be processed without plasticizer has created a whole range of applications in the fields of structural plastics and wire and cable insulation for polyvinyl materials, it is announced by B. F. Goodrich Chemical Co., Cleveland, Ohio. Called Geon 404, the resin has the electrical, physical, and chemical properties of pure, unmodified polyvinyl chloride, and can be processed (extrusion, calendering or molding) into "rigids" on conventional plastics equipment. Under present emergency conditions, according to the company, the new resin will be available in limited quantities and only for the development of military and other essential applications.

Application of Geon 404 in the electrical field will mean new and broader uses for the vinyls, it is declared. Rigid vinyl insulation based on 404 has electrical properties said to be definitely superior to and unattainable with plasticized polyvinyl chloride. The unique combinations of its superior physical properties (deformation, abrasion, and cutting resistance) and electricals indicate such possible uses as weatherproof line wire; primary insulation on aircraft wiring, eliminating need for a jacket; radio hook-up wire; television lead-in-wire; Navy cable and coaxial cable jackets and others.

The company states that Geon 404's outstanding chemical resistance coupled with ease of fabrication, machinability —and even weldability—introduces a Geon resin for the first time into the field of structural plastics.

Sheets, rods, and tubing of various diameters can be fabricated ranging from brilliant opaque to translucent and in a wide color variety. Rigid sheets can be welded by the hot gas technique, then fabricated into fume hoods and ducts for use where most metals are unsatisfactory. Tanks for corrosives can be made from it, in unsupported form, or as lining for metal tanks. In deep drawn and various welded forms it can be converted into pitchers, trays, funnels, buckets, barrels, etc., for use wherever an inert material is required. Other industrial equipment requiring this combination of machineable and chemical resistant plastic includes bearings, valves, gears, and scoops.

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IN
PISTON
RINGS

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With the experience and vision of your own organization . . . plus Pedrick's specialized knowledge of piston ring design . . . you have a team that can go far in achieving better engine performance.

Pedrick's contributions to ring design are a matter of record: the double-disc grinding method, centrifugally cast C90 special alloy, the narrower rings now recognized as more adaptable to varying engine conditions, the finest chrome-faced rings on the market, superior coatings, and, currently, a radically different ring expander.

These contributions have played a definite part in the development of today's advanced engines. If you have problems such as blow-by or oil control, where piston rings are a factor, Pedrick engineers are at your service. Write to WILKENING MANUFACTURING Co., Philadelphia 42, Pa. In Canada: Wilkening Manufacturing Company (Canada) Ltd., Toronto.



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## PRODUCTS for AIRCRAFT

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### R-25—Aircraft Tire Changer

Designed for removing heavy aircraft tires and the removal of tires from truck rims and contractors' equipment, a hydraulic tire changer announced by Dixie Tallyho, Inc., Fairburn, Ga., is hand operated and can be used both in the shop and in the field.

Eighteen tons of pressure can be exerted by the slight movement of the hand-operated pump, the company states, claiming that this "Tirematic" machine will remove the toughest tire from rusty rims.

"Tirematic" manual equipment is designed for large forward drop center

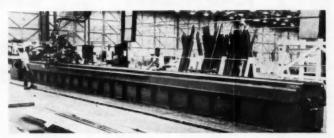


"Tirematic" tire changer introduced by Dixie Tallyho, Inc.

aircraft wheels. The units are adjustable to all tire sizes. The firm states that the machine has removed tires that have rusted on rims for seven years. Included in the tire removal equipment is a special dolly that is made so that one operator can change the tire or remove the wheel for brake service.

### R-26—Low-Tension Improved Cable

A greatly improved low-tension cable for lighting and power in aircraft has been placed on the market by the Construction Materials Department of General Electric Co., Bridgeport, Conn.



Farnham precision utility milling machine.

This new flamenol cable has a vinyl compound insulation covered with a protective nylon sheath. It is smooth, flexible, and abrasion resistant, and smaller in over-all diam than most approved aircraft cables. The wire is also stated to be exceptionally resistant to fungi, as well as to moisture, gasoline, oil, and grease. The wire is designed for 90 C operation and conforms to Specification AN-J-C-48a.

### R-27—Precision Milling Machine

Designed as a precision milling machine for use in aircraft production, the utility mill placed on the market by Farham Mfg. Div. of the Wiesner, Rapp Co., Inc., provides highly efficient, close-tolerance machining of extrusions, sections and billets of aluminum or other non-ferrous metals.

The machine is simply and cheaply tooled, and adaptable to many types of cuts. It finds use in production of non-ferrous metal parts, such as airplane stringers, longerons, empennage and control surface members.

It is used in manufacturing complete wing spar caps for experimental purposes or prototype airplanes; is handy for profile cuts on any long parts, and in machining of any non-ferrous rail, angle, frame or other long member.

Heavy duty 15-hp spindles and carriage feed speeds of 24 in. per min. to 190 in. per min. provide maximum removal of metal per minute. Each of the two spindles are arranged for individual horizontal hydraulic template control and are also furnished with Farnham template control for vertical motion. Both heads may be template actuated vertically and horizontally

from four individual templates at the same time. Each spindle also has manual adjustment for horizontal and vertical movement as well as swivel adjustment of 15 deg each side of vertical center.

### R-28—Range and Broadcast Receiver

New Narco LFR-1 range and broadcast receiver, put out by National Aeronautical Corp., Wings Field, Ambler, Pa., weighs only 35 oz and provides a "pancake" design giving dimensions of culy 2% in. high, 6% in. wide, and 6% in. deep, for installation in a very small space in or below any instrument panel. The dial of the LFR-1 features an "Army red" light for minimum pilot fatigue during night operation.

The electronic circuit of the receiver has seven tubes, including those in the power modulator unit, and features a germanium crystal diode detector. The receiver gives extreme selectivity for separating stations.

The receiver will plug into the Narco power modulator unit, used with the Narco omni range or VHF communication installation, and separate power supply will be available.



Narco LFR-1 range and broadcast receiver.

# STERLING



Sterling Engineers will work with you as they have with other leading manufacturers in developing pistons to meet your exacting requirements. Write or phone.



### Designing to Expedite Handling of Body Units

(Continued from page 47)

of suitable containers, which again, because of the size of the components, must be constructed sturdily.

The weight-to-bulk ratio, as might be expected, is an important factor in the cost of transportation. Because of the size, bulk, and shape of the steel stampings and assemblies, there is the danger of paying for the shipment of air, represented by the unused space between the parts packed into a railway car or truck. This means that components and sub-assemblies must be arranged to nest with a minimum amount of air space between them, whenever it can be done without interfering with the design or increasing the difficulty of assembly.

This nesting factor in Fisher Body is divided definitely in two parts: First, the design of sheet steel components making up the body shell, which

is determined early in the body design program; and, second, the decisions made relative to the installation of braces, brackets, and reinforcements. In other words, viewing the problem as a whole, shall this or that structural member be installed at the fabricating or assembly plant? Which is the most efficient, and how do costa commars?

Determination of the correct course to pursue is the joint responsibility of the body engineers, die design engineers and production engineers, plus that of the management of the fabricating and assembly plants and the Materials Handling Dept. The latter acts in a liaison capacity between the various groups, and is responsible for the design and construction of materials handling equipment.

There are many factors involved in the handling of materials that are not immediately apparent when one scans a body draft. As a consequence, the Production Engineering Section is required to produce nesting diagrams of all major assemblies, as body parts drawings are received from the Engineering Div. This is done prior to the physical availability of productive parts, and is of material assistance in bringing out facts not apparent from the body part drawing of a given part or assembly.

To settle questions that require the assistance and acquiescence of more than one of the interested parties, the problem is brought to the attention of the Committee for Allocation of Body Construction, the chairman of which is a member of the general manager's staff. Members of this committee include representatives of Die Design and Production Engineering, the general factory managers in charge of both fabricating and assembly plants, the Traffic Section, the Materials Handling Dept., and the Cost Analytical Section. Recommendations of this committee are brought through the Production Engineering Section to Body Engineering for final approval in all cases where structural changes in the design of the body are involved.

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Not only in precision ball bearings, but in countless other places, Strom has found that the right ball will do the job better. Maybe your problem can be solved with the use of the proper ball. Why not take it up with Strom.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.



### BOOKS.

PRESSWORKING OF METALS, by C. W. Himman, published by McGraw-Hill Book Co., 350 West \$2nd Street, New York 18, N. Y. Price \$8.00. This new edition was revised and enlarged to keep pace with modern engineering trends in the pressworking field. It covers methods, practical designs, reference data, selection of presses, workability of materials, and many basic tool designs that may be adapted to a wide variety of presswork problems. All types of presses in common use are illustrated and described.

The Cross-Type Universal Joint with Needle Bearings...



## ... Natural Development of a "DETROIT" First

Every industry has its leader—the company that sets the pace. In the field of universal joints, "DETROIT" units have consistently incorporated improvements that have become standard for the industry. From "DETROIT'S" pioneering in the use of needle bearing joints has evolved today's cross-type joint used on millions of cars, trucks and military vehicles.





Address all communications to 754 Belleville Ave., New Bedford, Mass.

#### Double - Duty Technique

(Continued from page 46)

 Internal transportation between fabrication and assembly departments is provided by gas and electric trucks and mules, drawing four-wheeled, threeby-five ft platform trailer trains.

Here the "double duty" technique has been applied in considerable detail. Pallets, racks and A-frames are added to trailer trucks. Large assembly dollies equipped with standard hitches and casters are transported from line to line by these same trucks. For instance, landing gear moves from the hydraulic shop to the assembly line on special dollies. These dollies protect the parts against damage during the lapse between hydraulic shop assembly and line installation. Once placed in position on the dolly, they do not have to be transferred again until ready for installation on the airplane. Standard hitches permit their movement as segments of trailer trains.

3.—Production line dollies also apply the double duty philosophy. Wings, fuselage sections and other major components are assembled in fixtures equipped with easters. They move down the production line on V-groove casters and inverted angle-iron tracks. Under normal production conditions, these dollies are advanced by hand or shop mule. In all cases, they are so designed and stressed that they can be converted to a mechanized line by addition of draw bars or interlocking lugs.

4.—Specialized equipment is used for handling large or fragile parts produced by vendors and subcontractors. Production and industrial engineers collaborated with vendors and subcontractors to incorporate shipping crate holding fixtures into these dollies. As a result, components travel from the receiving area directly to the installation point without transfer and with minimum handling.

5.—Large savings in materials handling costs were achieved by elimination of stockrooms for fabricated parts and assemblies and installation of a line-flow stocking method. Fabricated parts travel by trackless train directly to sub-assembly areas. Purchased parts are routed directly from warehouses to using areas. Sub-assemblies move directly to final assembly.

Stock racks designed to hold parts required for each assembly or installation are placed so they are no more than a step or two from the using assembler. Rack areas are based on production flow time plus a comfortable cushion. The savings in handling are obvious. Parts do not have to be unloaded, placed in stock, and loaded at

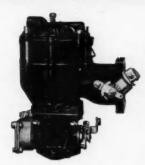
(Turn to page 76, please)

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In the practical field of commercial transportation, product preference is determined solely on performance. Nothing contributes more to the achievement of this desirable end than efficient carburetion. You can be sure that manufacturers whose vehicles are equipped with Zenith, the leader in the field of heavy duty carburetion, have measured carburetion costs in lasting terms rather than initial expense. Zenith's rugged construction, strong idling, freedom from stalling and response to every power demand gives any commercial vehicle added sales appeal. It pays to specify Zenith—the engineers' choice for trouble-free operation.

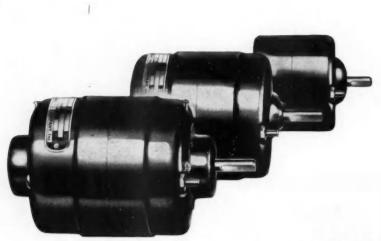
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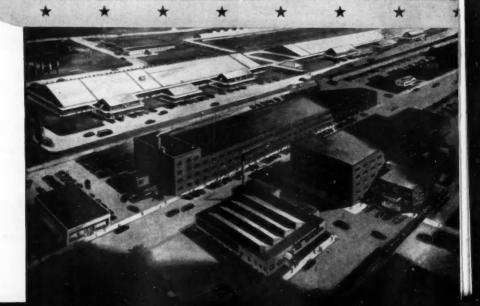
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## Redmond MICROMOTORS

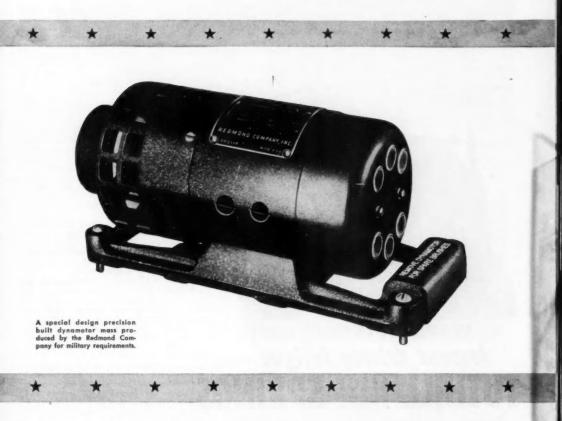


Series type electric motors, typical of Redmond's broad line of Micromotors and blowers for the automotive industry.





### THE BIG NAME IN SMALL MOTORS



### . . . and Manufacturers of Special Equipment for Defense Requirements

Whether for civilian or defense requirements, the dynamic multi-plant Redmond enterprise is ready with the engineering experience and mass production ability to tackle tough problems. Year after year, this organization has been producing dependable Redmond Micromotors and blowers by the millions for leading manufacturers. And once again, the Redmond Company is ready to serve in the mass production of military equipment. When the call is for low-range fractional horsepower motors, blowers, electric windshield wipers, dynamotors, or for special defense equipment, check with Redmond . . . the BIG name in Small Motors.

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Southwest Area: 1330 N. Industrial Blvd., Dallas, Tesas; Western Area:
(Redmond Company of Calif., Inc.) 1248 S. Boyle Ave., Los Angeles 23, Calif.
SERIES MOTOR SALES OFFICES: Owessen, Mich. OVERSEAS SALES OFFICES, AD
Lexington Ave., New York 17, N.Y., cable address, REDISING - NEW YORK.

stockrooms. Parts are readily available to assemblers. Transport of parts is systematized. Valuable space normally required for stockrooms is made available to production. Stock racks are placed in normally wasted areas adjacent to jigs and fixtures. Savings up to 25 per cent in handling costs are achieved by line stocking alone.

Emphasizing the importance of this method of parts stocking to materials handling men is the fact there are more than 30,000 components in the F-89. That requires intra-plant transport of more than 3,000,000 components for each hundred airplanes.

**USAF** Decentralizes Setup

(Continued from page 56)

bases within its geographic area.

Each air depot is known as a "zonal" depot, having parallel supply and maintenance responsibilities for a specific property class, on a zonal basis. A zonal depot also may be designated as either a "prime" or an "opposite" depot to indicate single property class functions, which are in addition to a depot's normal operations.

A "prime" depot is the master depot

which handles world-wide distribution of a specific property class, expedites deliveries from manufacturers, and assure that adequate supplies are on hand in each zone.

An "opposite" depot is located, physically, in the zone which is opposite the prime depot. It has the same responsibilities as the prime depot, but it looks to that depot for the answers to questions pertaining to the maintenance of sufficient stocks within its zone and for the furnishing of material received by them for priority requests which they cannot authorize.

There are eight Air Materiel Areas in the United States, three of which are in the Eastern zone, and five in the Western zone. Headquarters of each of these in the Eastern zone are located at Middletown, Pa.; Macon, Ga.; and Mobile, Ala. Headquarters of each of these in the Western zone are situated at Ogden, Utah; Oklahoma City, Okla.; San Bernardino, Calif.; Sacramento, Calif.; and San Antonio, Texas. At each of these locations there exists an area depot.

Middletown is the stock control point for the distribution of supplies to the European theaters; Mobile is the stock control point for the Caribbean; and Sacramento is the stock control point for the Pacific and Alaska.

A world-wide quarterly report on stock balance and consumption is made through channels to AMC by all USAF installations, and a monthly stock balance report is made by all depots. The 30-day report was initiated after the outbreak of the Korean war to assure adequate data on USAF supplies under emergency conditions.

In maintenance and transportation activities as well as in supply, the zonal system has been a vast improvement over the former AMC supply and maintenance setup.

## Books . . .

BRITISH MOTORCYCLES, edited by J. B. Ashby and D. J. Angier, published by Pentagon Publications, 25 Terminue Road, Eastbourne, England. Price \$2.00 postpaid. A complete picture of British motorcycle production is given in this one volume, including details of every machine now in production. The latest models of some \$2 manufacturers are described in separate articles, which are profusely illustrated.

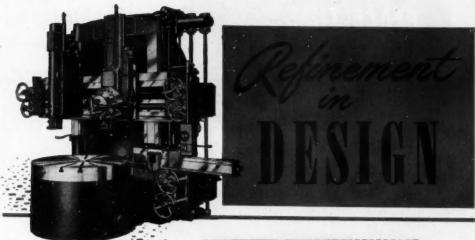
THE MOTOR VEHICLE, Fourth Edition, by K. Newton and W. Steeds, published by Ilife & Sone Ltd., Dorect House, Stamford Street, London, S. E. 1, England. Price \$7.75. The fourth edition of the book has been thoroughly revised and in parts rewritten so that it covers the most recent advances in automobile design. A portion of the book has been devoted to gas turbines as they apply to road vehicles.



## WARD LA FRANCE DIESEL lessens driving fatigue WITH TUTHILL ALLOY SPRINGS

Truckers know that jolts and jars cause greater fatigue than long hours behind the wheel. They also know that riding ease results in better safety-driving records, and fewer layoffs. That's why thousands of them—when buying overland, heavy duty jobs or other type carriers like the Ward LaFrance Tractor—insist on Tuthill Alloy Steel Springs.





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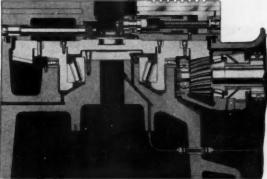
Pick up the machine and place it in the new location. No special foundation required.

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No need for lifting machine for bearing maintenance.

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## Renault Frigate in Production

(Continued from page 57)

flooring and the front one above the flooring at the height of the front seats. The windshield and the rear window are both curved.

The body is full width, with rear wheels half enclosed. A structural feature is that fenders, both front and rear, are held on by a series of studs and nuts, this having been done to facilitate repair work. The front seat is adjustable and its back rest will hinge down to form a full length couch.

Design of the 122 cu in. engine is similar in general to that of the smaller Renault engine, with four cylinders of 3.34 in. bore and a stroke of 3.45 in. Cylinders carry removable liners; the head is of light alloy with vertical valves operated through pushrods, and the cast steel crankshaft is carried in three main bearings. Compression ratio is 6.5 to 1 and maximum torque is 97 lb ft at 2300 rpm.

The four-speed transmission, forming a unit with the engine, has second, third and fourth synchronized, with overdrive on fourth. The power plant has three-point attachment to the body, two being at the front on rubber blocks and the third being on an elastic cradle. The drive shaft is in two parts, with Spicer universals, a feature being an elastic mounting at the rear end of the front shaft. This mounting is carried on a transverse spring with its extremities held between rubber blocks.

All wheels are independently sprung, the front being by short and long support arms, with a vertical coil spring. The differential housing is suspended at three points, with rubber cushions. Rear suspension is by vertical coil springs, with welded pressed steel support arms, each pivoting on a transverse shaft mounted in brackets on one of the cross members. The shafts on which the support arms are articulated are set at a slight angle, so that the camber, which varies with the rise and fall of the wheel, provides increased stability on turns. Stabilizer bars are fitted front and rear.

Brakes are 11-in. Bendix floating type hydraulic with 2½-in. front linings and 2 in. linings at the rear. Steering is rack and pinion, with the gearshift lever under the steering wheel. Tires are 6.40-15.

No price announcement has yet been made. It is understood that it will be highly competitive and doubtless will be under that of the Citroen model of practically equivalent performance which, for several years, has held a monopoly in France.



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Before you swing into action with your Acme-Gridleys, profit by our ready-made experiences. Save the cost of experimentation and the loss of precious time. Acme-Gridley standardized procedures and tooling can by-pass these losses for you. Just tell our engineering experts how they can help you—they'll do the rest.



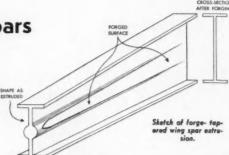
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No other source offers a line so COMPLETE—so much design and tooling EXPERIENCE in Multiple and Single Spindle Bar and Chucking Automatics.

Forged-Tapered Wing Spars Reduce Plane Weight

F ORGE-TAPERED aluminum wing spars are being produced on an experimental basis by the Aluminum Co. of America and McDonnell Aircraft Corp. The novelty of the new method of wing spar fabrication lies in providing a bulb of aluminum in the web of what otherwise is an I-beam type extrusion. The extrusion is then forged in such a manner that the bulb of aluminum is progressively filattened.



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BALLS

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Procedure of the second Precision balls made for your job - available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations. HARTFORD STEEL BALL HARTFORD 6, CONN. NEWARK, N. J. LOS ANGELES, CAL EXPORT COMMENTEE FROST BLOG E D. MALTEY CO. . N. A. RODICOUT INC. 877 BROAD ST. 1718 SOUTH FLOWER ST. SS. M. 47 ND ST. NEW YORK W 2 TURNER VICTOR & CLARK
445 NEW CENTER BLOG SOS W WASHINGTON BLVD

After forging, the web tapers from 10 in. at one end to approximately 15½ in. at the other. The result is a forge-tapered extrusion. Alcoa's Lafayette Works extrudes and the Cleveland Works forges the metal. McDonnell rough machines the forge-tapered extrusion and returns it to Alcoa for heat-treatment and stretching. Then the extrusion goes back to McDonnell for final machining operations. The length of the spar is slightly over 13 ft. Its final weight is 117 lb.

Ordinarily, spars are made by using two extrusions whose cross-sections resemble T's. Small pieces of aluminum plate are riveted to the two extrusions to make a wing spar which tapers. Many separate operations are required and a great number of rivet joints must be made.

About 50 parts are replaced by the new forge-tapered wing spar, thus eliminating many of the riveting operations. Because of the unified structure of the forge-tapered spar there is little possibility of joint fatigue. The use of one solid section, made of high strength Alcoa 75S-T-6 aluminum alloy, greatly increases the strength of the spar.

Most important result of the new spar is a 50 lb reduction in weight in the fighter plane for which the spar is being fabricated.

#### Radios and Heaters on Shortage List

Radios and heaters are becoming increasingly more scarce because of the limitation orders effecting use of copper. One of the Big Three has stopped shipping radios and heaters to its wholesale outlets because they can scarcely obtain enough of these items for installation on new cars on customer order. Another company is able to supply its dealers with radios, but heaters are on the critical list and certain other unspecified parts are also critical. Small motors used in heaters are very difficult to get and because cores contain considerable heater copper, they are in extremely short supply. Another large company recently pulled in all its heaters in warehouses from warm weather states to insure enough to meet requirements in cold areas.

#### Preview of Indianapolis Race

(Continued from page 33)

appear at the big loop, according to Diedt, who says his car at 1750 lb weighs 300-350 lb less than previous front drive entries. He used light metals in the chassis construction.

The chassis is a riveted box section, 26 in. wide, of ½ in. 24ST aluminum with cross members of 40E aluminum. The channels of the box section measure 1% in. by 5 in.

Measurements of the car are: Overall length, 147½ in.; wheelbase, 102 in.; body width, 36 in.; tread, 60 in. front, 58 in. rear. Cast magnesium disk wheels, with the 18 in. tires, give the car 4½ in. clearance. Highest point of the body reaches 37 in. from the track.

A body design feature of the car is a filled-out rear section instead of the customary tapered construction leading back from the driver's headrest point. This fuller rear construction makes for improved airflow and better accommodation of the 57 gal all steel single fuel tank in the car. An oil tank holding 9½ gal is also placed in the area behind the driver's seat.

The Meyer and Drake Offenhauser 270 cu in. engine powers the car. Leo Goossen, executive engineer of Meyer and Drake, designed a lighter weight front drive assembly.

Compactness and lightness in weight are the features of the new rear drive Grant Piston Ring Special entered by J. C. Agajanian, San Pedro, Calif., and built by Edward Kuzma, Inglewood, Calif. Weighing only 1600 lb, the car will be one of the lightest in the race. Overall length is 12 ft, with a 96 in. wheelbase. The tread will be 53 in. Cast magnesium disk wheels are planned, and if used, track clearance will be four in.

The chassis construction, 25 in. wide, is tubular framing of 4130 steel, with single tubing each side. The car has a conventional front axle with transverse spring mountings, and torsion bar rear suspension. Kuzma hopes, before race time, to have a new model Conze rear axle, and new type lighter and stronger Conze spindles.

The car has one 40-gal steel tank in the tail and one 20-gal aluminum tank under the seat. Using straight alcohol instead of a blend, only one refueling stop is scheduled. A Meyer and Drake Offenhauser 270 cu in. engine powers the car.

Two new rear drive cars built by Gordon Schroeder, Burbank, Calif., use straight side rails in conjunction with lightweight castings for attaching cross members and suspension units. These cars are owned by the Brown Motor Co., Richmond, Ind., and Blakely and McDaniel, Phoenix, Ariz. The cars have a 100 in. wheelbase and 58 in. tread. Total weight is about 1700 lb.

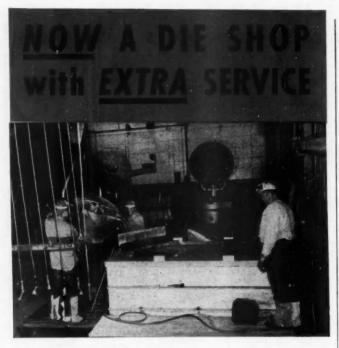
Frame rails of the cars are of channel section dural, riveted to form a 1% in. by 5 in. box, with the outer channel thickness 0.114 in. and the inner 0.091 in. The front and seat cross members and all of the side castings are heat treated magnesium, while the motor plates and rear cross member are % in. aluminum alloy. The result is a light but rigid frame. All of the castings are held in place by bolts passing

through both halves of the castings and the frame rails. Each bolt also passes through a magnesium spacer located within the rail.

Front suspension on these cars is unique in that the load bearing upper "A" arm is cast, of 4130 chrome-moly steel, while most cars use a fabricated and milled part. This arm is splined directly to the front torsion bar which

(Turn to page 82, please)





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Both cars use Goodyear spot type brakes developed for aircraft use, self adjusting and shackle mounted. Front and rear brake systems are independent but are controlled simultaneously by either the foot pedal or hand brake lever.

A new steering unit designed by Schroeder has a right and left hand worm cut on a common shaft. These worms, through gears, drive the right and left Pitman arms. This arrangement, it is believed by the designers, will greatly reduce driver fatigue which results from road shock.

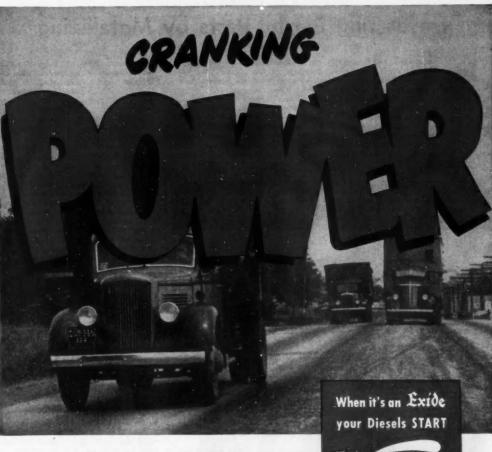
The improved Meyer and Drake Offenhauser 270 cu in. engine will power both cars. Hilborn-Travers fuel injectors will be used. Two steel fuel tanks with a total capacity of 65 gal are mounted behind the driver. A nine gal capacity oil tank is located between the engine and radiator.

Two Blue Crown Spark Plug Specials designed and built by Lou Moore are entered this year. Moore sold the four-cylinder rear drive cars last summer. The one entered by Lindsey Hopkins, Jr., of Miami, Florida, placed sixth in the 1950 race. Henry Banks will drive the car this year. Charles Marant, of Trenton, N. J., entered the other Blue Crown Spark Plug Special. George Connor is to drive the car, in which he placed third in 1949 and eighth in 1950.

The two Novis, owned by the Winfield Engineering Co., of California, are entered this year as the Novi Purelube Specials. Both are front drive cars with eight-cylinder, V-type, 181 cu in. supercharged engines. Bud Winfield, designer and builder of the cars, was killed in a traffic accident last year. Jean Marcenac is carrying out Winfield's ideas for a complete rebuilding of the engines with new cylinder blocks. Marcenac has changed the spark plug location from the center of the cylinders to an angle position in order to allow more space between the spark plugs and the valve seats. The bore has been increased 1/16 in. to 3-3/16 in., and the stroke shortened from 2.937 to 2.840.

Despite their tremendous power, accidents and mechanical trouble have dogged the Novis to such an extent that they never have finished better than third in any Indianapolis race.

Kurtis-Kraft built two new cars of its 3000 Series for this year's race. They are the same as described in AUTOMOTIVE INDUSTRIES, May 1, 1950, "What's New At Indianapolis This Year?" Last year's winner, Johnnie Parsons, will drive the Ed Walsh entry, the Wynn Friction Proofing Special, built by Kurtis-Kraft.



#### Day after day, in all climates, you can count on toe cranking power

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DEPENDABLE BATTERIES FOR 63 YEARS

1951

#### Decorating Plastic Parts by Metallizing

(Continued from page 54)

process. It is the vapor metallizing of plastics, by means of which a very thin film of metal is deposited, in high vacuum, upon the surface of the plastics material. The metal so used is aluminum, though other metals can be applied by the same process. Aluminum gives a bright silvery appearance to the surfaces coated. By using the metallic film for undersurfaces of clear plastics, so that it is visible through the material but is protected by the thickness of the plastics, one of the disadvantages of the process is overcome. The film produced by vapor metallizing is very thin-only a few hundred-thousandths of an inch in thickness-and would lack durability if used where it would be subject to wear.

The plastic material itself is usually methyl methacrylate polymer. It possesses high clarity and fair resistance to abrasion. Horn buttons, deck plates, decorative escutcheon plates in the car interior, door openers, etc., are made by molding the material in a decorative design and metallizing the under-surface to bring out the design in silvery lustre. By using paint in one or more colors in addition to the metallizing, colorful effects can be achieved.

The process consists of placing the molded plastic pieces in a bell jar or metal container, with fixtures or frames to support several dozen of pieces at each loading, exhausting the jar or chamber to a vacuum of at least 1 micron of mercury, and preferably half that or better, then passing a current through electrodes on which a wafer of aluminum is placed. The aluminum is volatilized in a fraction of a second, and the vapor travels in a straight line to the surfaces upon which it impinges. The vacuum is then broken and the completed work is removed

from the chamber.

For most of the pieces, the design is molded into the clear plastic from the under side, in intaglio. This design is then metallized, so that the design appears to be done in silvery metal and covered with the clear synthetic material. If the design is to include one or more colors in addition to the metallizing, tightly fitting masks are prepared, by electroforming or by some other means, and snapped into place so as to cover all of the area in the recessed part of the plastic piece except that which will be colored with the paint to be applied. The paint is then applied with a spray gun. If several colors are to be used, a mask for each color is made up, and the process of masking and spraying is repeated for Areas to be metallized will be kept clear throughout the paint spraying, and the piece will then be metallized over the entire recessed surface, with the metal showing through at the clear areas only. An overcoat of paint may be applied to back up the entire decorative finishing.

There are few critical factors in the process. Vacuum must be high to avoid contamination of the surfaces, and this requires avoiding materials that will have a vapor pressure at the high vacuum sufficient to give off vapors. Work must be properly dried if paint layers have been used as part of the decoration, but no special cleaning or other preparation of the work surface is necessary. The matter of vapor pressure is of no consequence in work with the plastics, nor with the familiar metals, nor with cloth and similar materials. It is sufficiently high in the case of wood to prevent satisfactory metallizing of that material in a vacuum. The aluminum used is insignificant as to quantity, and need

(Turn to page 86, please)

#### PRECISION PARTS

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#### puts more productive horsepower into driving wheels!

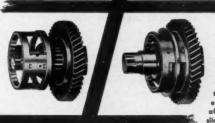
#### **HOW IT WORKS**

The gear on the main shaft free-wheels until needed, but is, always in mesh with the gear train. The main shaft is directly connected to the rear end, and revolves at a speed proportional to the road speed of the vehicle.



3 When the gear is synchronized with the shaft, the shift is made by engaging the shifter clutch, which is shown here. Since the gear is now standing still as far as the shifter-clutch is concerned, the teeth are easily pushed into mesh.

2 The gear is brought to shaft speed (synchronizing it) by pressing a special bronze cone against the mating cone on the side of the gear. This bronze cone is part of a -leeve which is held on the shaft by the shifter gear, being free enough to rock through a small angle.



Sliding shifter clutch (view 3) forces sleeve (view 2) to move ahead of it, under spring pressure. Cone friction turns sleeve, sleeve traps posts on shifter clutch. Force on shift clutch passes directly to friction cone. Shifter clutch is then held until cone no longer exerts turning force on sleeve, after which shifter clutch slides into tooth engagement.

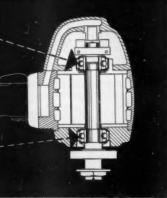
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Portable Air and Electric Tools for Industry

be of no special purity. Ordinary 2S aluminum, the commercially metal, is used.

The metal film is too thin to have any wear resistance, such as would be expected of electroplated surfaces. does not have any hiding power, so the surfaces to be coated must be as free from defects as the character of the finished piece requires. It is too thin to withstand any polishing or buffing, so those metals that will lay down a film of bright metal are chosen for vapor coating. The thinness of the coating likewise prevents it from conferring any hardness upon the surface coated, so that metallizing for that purpose cannot be done by vaporizing in

Aluminum is the most widely used metal for vacuum metallizing, but most other metals can be applied in this way. A horn button metallized with pure gold was made successfully for the automobile industry. Chromium and nickel can be vaporized, but the films laid down are dull in appearance, and so are not satisfactory for decorative purposes.

#### **Publications** Available

(Continued from page 64)

materials which blanket the range of materials characteristics from laminated plastics to paperboards, has just been issued.

#### A-123 Electric Motors

Wagner Electric Corp.-Type EP and JP polyphase squirrel-cage motors are illustrated and described in a pamphlet recently announced by the company. Dimension specifications are given for the type EP electric motor.

#### A-124 Motor Controls

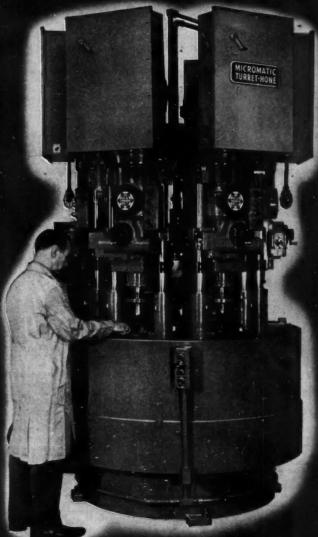
Electric Machinery Mfg. Co.-An eight-page, two color bulletin illustrates and describes in detail all the standard types of polarized field frequency synchronous motor controls for full-voltage, reduced-voltage, and partwinding starting.

#### A-125 Punch Presses

L & J Press Corp.—A new condensed catalog that describes and illustrates all L & J punch presses has just been issued. Complete, detailed specifications are given for every model and include fully dimensioned diagrams of the lower rams.

AUTOMOTIVE INDUSTRIES Keeps You Informed

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One Machine
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#### Efficient Materials Handling Vital to Automotive Production

(Continued from page 36)

indispensable such equipment as industrial trucks and tractors. Powerful, fast, and mobile, these vehicles transport parts and materials from one department to another; deliver heavy loads to machines and stores; aid in organizing good housekeeping and con-

In addition, these plants have found servation of valuable floor space by tiering parts and pallets and boxes in stock rooms as well as at machine lines. In some cases, industrial trucks load and unload heat treating furnaces, install and remove press dies, and transport machinery on skids from one location to another.

Lifts and hoists not only transport heavy parts and assemblies to and from assembly lines, they are also employed for handling heavy parts in and out of metal cutting machines.

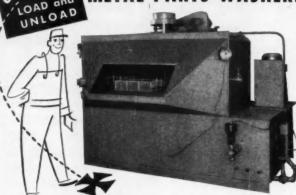
Materials handling has come up in recent years with the most effective and productive technique-in terms of dollar savings-known to the art. We refer to palletizing. Instead of handling parts in bags or tote boxes or in loose unorganized loads in trucks and freight cars, the latest development is that of palletizing. Here the parts, even including large rough castings such as cylinder blocks and transmission cases, are loaded on specially designed pallets either of permanent or disposable types at the point of origin. These pallets then are shipped either by truck or rail, unloaded at the receiving end and placed in stores or at machine or assembly lines while still on the pallets. This field of activity is primarily that of industrial trucks.

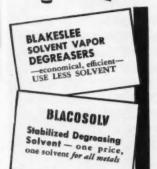
It would take considerable time and space to mention the variety of materials handling devices used in the automotive industries. Fortunately, the Materials Handling Activity of the American Society of Mechanical Engineers classified these devices some time ago in an effort at a standardized nomenclature. ASME classified them in seven major categories-cranes, conveyors, tractors and trailers, trucks (skids and pallets), railroad equipment, tiering machines, and lifts and hoists. In the category of conveyors alone, there are the following classificationsroller gravity, roller live, wheel type, belt type, drag type, apron type, bucket type, and ball and caster transfer conveyors. Even this quick look at the breakdown will give a good impression of the diversity of such equipment in modern usage.

In this connection, it is of interest to comment on roller type conveyors as they are used in the automotive indus-Here is one of the oldest and most widely used devices known to the art. Gravity roller conveyors, in particular, have proved their utility in connecting machine lines for the movement of work from one operation to another. They are used for the movement of parts to and from sub-assembly and assembly lines; for loading and unloading heat treating and hydrogen brazing furnaces, more recently by means of fully automatic cycles; and in body plants for the movement of sheet metal parts. Roller conveyors are extremely versatile in application. They are being used in conjunction with the high performance transfer machine lines at one end of the scale; and take the place of other kinds of materials handling devices in plants where power driven conveyor systems cannot be justified.

Truly materials handling is as much a part of the mass production process as is the machine. This is indicated by the illustrations reproduced here, showing some typical installations in modern automotive plants.







#### Blakeslee's new washer saves labor, is economical

Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

#### G. S. BLAKESLEE & CO.

1844 S. 52nd Avenue . Chicago 50, Illinois New York, N. Y. Torente, Ont.

## Grand way to cut range production costs







Progressive dies blanking and forming main top of Grand Range.

OUR new Cleveland Double Crank Press enables us to form every stamping used in Grand gas ranges—right here in our own plant. Wide bed area and exceptional clearance of the slide, when open, allowed us to redesign our dies for more economical operation," stated Mr. E. F. Kennedy, superintendent of Grand Home Appliance Division, Grand Industries, Inc. "Furthermore, our production can be readily stepped up by using two or even three progressive dies in this press at the same time. We expect further production economies, for we will be able

to stamp several parts that are now fabricated. Our new Cleveland is helping to make Grand gas ranges a better product while at the same time cutting our production costs."

You, too, can realize similar savings in your production costs. Cleveland engineers have wide experience in all phases of the metal stamping industry. Why not call in a Cleveland engineer to study your production . . . find out how Cleveland Presses can reduce your production costs. Contact us today . . . no obligation.





#### PRECISION-MADE IN A PRECISION PLANT

Here in the new HY-PRO plant our entire production is geared to a single, high standard. To maintain that standard, only the most modern precision machines and equipment are used.

Of equal importance is the combined specialized knowledge of our Engineering and Laboratory Staffs that closely direct and control every stage of production from raw material to final finishing.



#### SUSTAINED ACCURACY

Special processing methods impart to each MY-PRO Tap an extreme degree of strength and stamina that permits its original accuracy to be sustained far beyond ordinary limits.

It is this "sustained accuracy" that enables HY-PRO taps to consistently produce more accurately threaded holes per tap to materially lower the cost of your tapping operations.



Call your nearest HY-PRO Distributor, and order your requirements from the full line of High Speed Steel Ground Thread Taps stocked for your convenience or made on order to your specifications. A factory trained HY-PRO Field Engineer will gladly call at your request.

COMMERCIAL . PRECISION . SPECIAL

High Speed Steel Ground Thread Taps -

## HY-PRO TOOL CO.

A Subsidiary of Continental Screw Co.

#### METALS

(Continued from page 55)

#### **Tin Outlook Clouded**

After collapsing from \$1.82 to \$1.34 cents a pound the tin price strengthened to \$1.46 as RFC resumed buying, and later advanced to \$1.50. On April 10 it was cut to \$1.47. These gyrations indicate that RFC has yet to come up with a firm price policy on tin. The agency has come in for considerable criticism. Some importers have offered tin at less than the RFC price but can't bring it into this country and sell it to private users as RFC by law is the sole importer.

The long range price position of tin appears none too secure. Big consumers are skeptical that the present level can hold, Substitution of other metals for tin are reported. American Can Co. declares it will continue the use of tinless cans even after the present emergency regardless of what happens to price and availability of tin.

#### Lead Prices May Head Upwards

Lead continues to be in brisk demand. Last of the major metals to come under inventory control, NPA recognized the increasingly tight situation in lead and limited inventories to a 30-day supply as well as restricting civilian use to the monthly average of the first half of 1950. In effect this amounted to a substantial cut-back in the amount of lead permitted for consumption, as deliveries in recent months have been almost 50 per cent larger than the average monthly consumption a year ago.

Lead supply is almost certain to become more difficult for consumers and a sellers' market appears definitely ahead. Last year this country imported 520,000 tons of lead from abroad as pigs or concentrates. The sales manager of American Smelting & Refining Co., one of the largest sellers of lead, anticipates that lead imports may decline 50 per cent in 1951. This would cut total over-all supply about 23 per cent. The higher lead tariff went into effect January 1 and the better price obtainable in Great Britain and on the Continent for the metal discourage foreign producers from selling to the United States. Add to this the threat of a strike at Mexican mines that normally provide half of total lead imports and the picture becomes darker.

Neither is there a plentiful supply of scrap lead. Custom smelter units that buy lead storage battery plates have cut their smelting charge in an effort to attract scrap without gaining much additional metal. As the breakeven smelter charge is \$35 to \$40 per ton while the present charge is \$25 this amounts to paying a premium for lead scrap.

(Turn to page 92, please)



### Hydro-Lectric Push-Button Tops **Brought Back the Convertible!**

Convertibles-always popular with a certain segment of the driving public-were given a terrific sales boost with the development of Hydro-Lectric top operating mechanisms. The ability to raise or lower the top at the touch of a finger made the convertible an all season model appealing to all age groups in all sections of the country.

Detroit Harvester pioneered this convenience as well as improvements in the top mechanism itself-snugger fit, reduction of unsightly linkage and elimination of binding through the perfect equalization of hydraulic effort on both sides. The same Hydro-Lectric power unit which operates the top can motivate all windows, driver's seat, deck lid, and hood.



BUILDING, DETROIT, MICHIGAN





















(Continued from page 90)

#### Little Change in Copper

The latest statistics of the Copper Institute show a slight increase in crude production from domestic mines with 90,671 tons in March compared with an average monthly output in 1960 of 88,100 tons. Deliveries to fabricators in March totaled 116,793 compared with a monthly average of 118,-500 tons in the last quarter of 1950. Refined stocks declined to 55,609 tons from 59,324 tons at the end of February.

Deliveries by fabricators to consum-

ers were probably in excess of copper they received from producers and custom smelters. Figures for the fabricators lag about two weeks behind those for the producers, but in February, the latest period for which comparisons can be made, fabricators were obliged to dig into their own inventories to make deliveries in addition to all they bought from the producers.

Custom smelters complain that they are unable to obtain scrap for secondary production because much higher prices are being paid on the outside market. They point out that the official price they can pay for No. 1 scrap

is 21½ cents which allows them three cents to cover processing costs if they are to sell at 24½ cents. But No. 1 scrap has sold in the outside market for 31-32 cents a pound. Because of their higher price ceilings, some brass manufacturers can afford to buy copper scrap at top prices. It's expected that OPS will establish ceiling prices for scrap and make them stick, as well as to channel scrap supplies to the custom smelters without interference.

The House voted to lift the duty of two cents a pound on imports of copper for two years. The measure now goes to the Senate. Administration approval is already assured, yet tariff suspension is liable to have rough sailing in the Senate where opposition by Western senators is well organized. Ultimately the measure will be passed but it's questionable if it will bring in any more copper from abroad. Domestic buyers have been quite willing to pay the tariff for their own account if they can get the metal.

#### Peak Demand for Steel in May

A stringent shortage in steel scrap continues to plague the steel industry. The price ceiling on scrap is blamed as a major factor in the short supply, yet steel production continues to zoom upward with March establishing an all-time record of 9 million tons output. The rapid expansion of the steel manufacturing capacity is sufficient explanation why shortages in consumers' durable goods have not been more pronounced.

The pressure on mills from consumers may reach its peak in May with some possibility it may level off in the following months. Some trade authorities even predict a steel surplus by July. Maybe so, but there are small signs of it at present.

## Seven Initial Orders to be Issued for CMP

Washington Bureau, AUTOMOTIVE INDUSTRIES

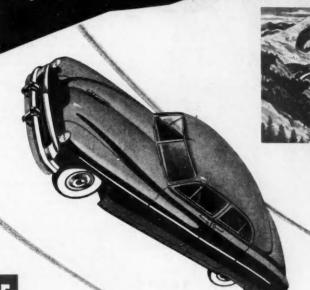
The outlook for steel, copper and aluminum for production of passenger cars (except on defense orders) is just as vague as ever following the long-awaited announcement of the Controlled Materials Plan (CMP) by the National Production Authority.

Initial details of the CMP were revealed in mid-April. It will go into effect as of July 1. But NPA frankly admits that it does not expect too much in the way of results before the last quarter 1951, that the third quarter will prove to be little more than a shaking down period.

There are these differences between the present CMP and that of World (Turn to page 94, please)



## FIRST 15 CARS in Mobilgas Economy Run equipped with B-W OVERDRIVE!



igured on a straight miles-per-gallon basis, the best records in the 840-mile Mobilgas Economy. Run for 1951 were made by 15 stock automobiles equipped with B-W Over-drive. On a ton-mile basis, the grand sweepstakes winner every year from the start of this annual contest supervised by the AAA has been equipped with this famous B-W transmission unit. Offered on many leading makes of cars, B-W Overdrive cuts engine revolutions 30%... gives up to 3 miles "free" in every 10.

Made by B-W's Warner Gear Division, B-W Overdrive is an outstanding example of Borg-Warner's "design it better, make it better" policy . . . typical of the advanced engineering and precision production with which Borg-Warner serves the automotive industry.

B-W engineering makes it work
B-W production makes it available

Almost every American benefits every day from the 185 products made by **BORG-WARNER** 



THESE UNITS FORM BORG-WARNER, Encutive Offices, Chicogo: BORG & BECK BORG-WARNER INTERNATIONAL - BORG-WARNER SERVICE PARTS - CALUMET STEEL BETROIT VAPOR STOVE - FRANKLIN STEEL INGERSOLL PRODUCTS INGERSOLL STEEL - LONG MANUFACTURING - LONG MANUFACTURING CO., LTD. - MARBON MARVEL-SCHEBLER PRODUCTS - MECHANICS UNIVERSAL JOINT - MORSE CHAIN MORSE CHAIN OL, LTD. - NORGE - MORGE-HEAT - PESCO PRODUCTS - ROCKFORG CLUTCH SPRING DIVISION - WARNER AUTOMOTIVE PARTS - WARNER GEAR - WARNER GEAR CO., LTD.



BUS SEAT BACKS

and SCUFF PLATES

made of



Scuffs and dents mar the beauty of automobiles and busses quickly and easily, adding heavily to repair and maintenance costs. When scuff plates and bus sed backs are made of decorative, durable RIGIDIZED METALS, original beauty receives permanent surface protection. The three-dimensional designs of RIGIDIZED METALS conceal all the ugly scratches and dents due to daily wear-and-tear. Refinishing jobs are no longer necessary. This versatile metal may be applied to many other product applications throughout the transportation field. Flooring, panels, trim, treadplates and kickplates of RIGIDIZED METALS are saving maintenance costs, reducing weight, increasing strength, and CONSERVING CRITICAL MATERIALS today. It will be to your advantage ts investigate the untimited possibilities offered you by RIGIDIZED METALS now.



War II—the 1951 style will be "open end," that is, limited to defense and essential related programs or production and it applies only to the three mentioned metals.

Seven initial orders will be issued. They will be: CMP-1, Rules for operation and procedure; CMP-2, Inventories; CMP-3, Preference Ratings; CMP-4, Warehousing; CMP-5, MRO; CMP-6, Construction; and, CMP-7, Repair Shops (industrial).

There will be two phases of the program. The first will get under way about the first of May when printed forms for reporting requirements and instructions are ready for distribution. Requirement forms should be returned by mid-May if possible. These requirements must be filed by manufacturers of products for the military, atomic energy, and supporting programs, Manufacturers of other products except consumer durables must also file requirements for the three metals.

The tentative list of products for which applications are not required to be filed include passenger cars or vehicles, automobile trailers except truck or house, motorcycles and bicycles, household types of refrigerators, washers, electrical appliances, dishwashers, and many other types of consumer durables.

Manufacturers of repair and replacement parts will likewise be required to file but not industrial repair shops such as those integrated with a plant or factory. A special provision, CMP-7, will be issued to take care of them.

The second step will be to make final determination of actual needs for essential and military programs, the subsequent authorization of specific production schedules, and the allocation of materials, by quarters, to meet these schedules.

Program determinations will be made by DPA's Requirements Committee. Each claimant agency will be given a tonnage allotment on the basis of its needs and in ratio to other claimant needs. And each contract issued by the agency will be charged against its account or allotment. Contracts may not be issued in excess of the quarterly allotment—and any tonnage in excess of contracts for the quarter cannot be carried over but must be returned to

As during wartime, there will be "A" and "B" clasifications. In general, the "A" group includes products where the manufacturer gets his authorizations and allotments vertically—from the customer such as from a Government Agency. In the "B" category are those products where it is most practicable to furnish authorizations horizontally—that is, directly to the producer from an NPA industry division.

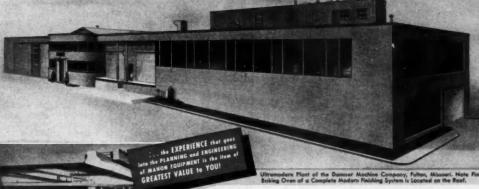
There is no doubt that demands will exceed the foreseeable supplies. Unofficially, NPA officials would not be surprised if these ran as high as 150 pct of production. They expect defense and

(Turn to page 96, please)

### COMPLETE

### SYSTEMS

for ENAMEL . LACQUER . PAINT



### Small Plant Operators, Too, CUT FINISHING COSTS with MODERN MAHON EQUIPMENT!

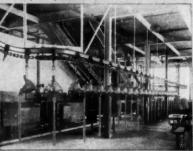
While the Mahon Nameplate appears on Finishing Equipment in almost every large production plant in the country, it is singularly significant that so many comparatively small companies also pay a little more for modern Mahon equipment. The Danuser Machine Company, Fulton, Missouri, manufacturers of earth moving equipment and farm tools, is a typical example. This company operates a Complete Mahon Finishing System specially designed to meet its specific production requirements . . . the completely conveyorized system consists of a two-stage Cleaning Machine, Dry-Off Oven, a two-color Flow-Coating Machine and a Finish Baking Oven—the latter being an outdoor oven installed on the roof to conserve space. The owner of this plant is one of many small plant operators who have found that their finishing equipment requirements will receive from Mahon the same careful preliminary study, and the same experience-backed planning and engineering that goes into finishing systems installed for the largest plants in the world. If you are contemplating new equipment, do not hesitate to call in Mahon engineers . . . you will benefit from a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Mechanical Industries File for complete information, or write for Catalog A-650.



Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Fickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-Off Ovens, Hydra-Filter Sproy Booths, Filtered Air Supply Systems, and Drying and Baking Ovens: Core Ovens, Dust Callecting Systems, Fog-Filters, and many other Units of Special Equipment.

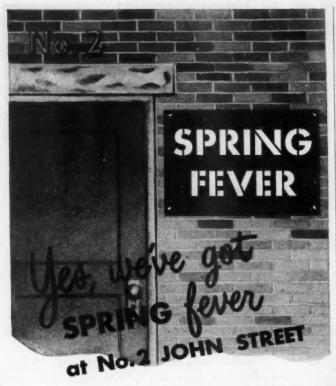


Mustration Above Shows Compact Arrangement of a Complete Mahan Finishing System Designed to Handle Finishing Production in a Comparatively Small Plant.



Loading and Unloading Area. Two-Stage Cleaning Machine and a Two-Color Flow-Coating Machine are in the Background.

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. . . and we've had it for more than 60 years . . . a burning ambition to make constantly better springs.

As long-time specialists in hot or cold wound springs, our engineers are often instrumental in helping people like yourself improve product performance and reduce production costs. Our old customers (and we hope you will become one) have learned to look to No. 2 John Street as a thoroughly reliable and unusually prompt source of supply.

#### AMERICAN-FORT PITT SPRING DIVISION

H. K. Porter Company, Inc.

No. 2 John Street, McKees Rocks, Pa. (Pittsburgh District)



supporting programs to request nearly as much as the total available supply.

There are certain to be specific shortages. For instance, defense programs will take all cobalt and columbium, nearly all nickel, and a high percentage of structural steel.

Control of materials left over after defense and related programs have received their allocations will be exercised through existing procedures such as M-Orders. These may be tightened or relaxed as the situation demands by raising or lowering the existing percentages.

This is where the automobile industry may be squeezed. For example, the amount of steel left-over after allocations for essential programs may be such that the present 80 pct limitation may have to be lowered. And assuming that the limitation on non-CMP steel remains as it stands, lack of bearings or other parts and components because of CMP drains, could further limit production.

Some representatives of the automobile industry have been urging that the limitation on production be shifted to specific unit volume rather than by metal tonnage. Meetings with the industries will be held to discuss the matter but currently the guess is that no changes will be made.

changes will be made.

For instance, the "death sentence" on less essential aluminum end items has been postponed for a month. It now seems doubtful if it may ever be made effective—at least on all items as originally proposed. It is now hinted that similar restrictions on copper might be relaxed later.

As CMP gets under way, military and industrial expansion programs will definitely be the first recipients of allocations under the new system. Other schedules and requests will be taken up in the order of their seeming importance.

Provision for special priority assistance for small business concerns is now being talked up—if these firms seem to run into difficulty.

#### The Machine Tool Bottleneck

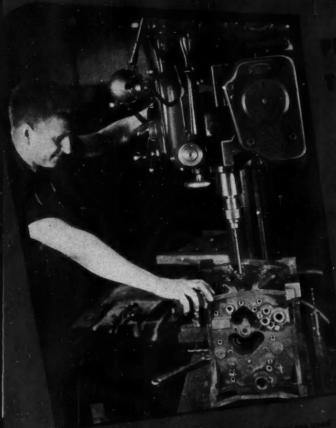
(Continued from page 60)

manpower conservation he suggested the draft deferment of men having specialized technical knowledge and discussed the problem of women working in the plants.

Also featured during the two days were technical sessions and plant tours. Large attendances were recorded at the technical meetings, during which the following papers were presented.

Factors Determining the Use of Hydraulic, Electrical and Mechanical Drives—E. J. Revoira, executive engineer, The Cincinnati Milling Machine Co.

(Turn to page 98, please)



And those types of the Cottle O Drift Rig the beings and heart are supported by the control of the country of t

EX-CELL-O COSTORA

BARTHATTON OF PERCENCE MARKET AND MARKET AND SERVICE PROPERTY OF THE PERCENCE OF THE PERCENCE





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This Ex-Cell-O catalog, Bulletin 35371, will help you pick the right bushing to fit the job. A copy will be sent to you on request witheut obligation.

Electrical Control for Hydraulic Presses-K. B. Rexford, supervisor electrical design, The Hydraulic Press Manufacturing Co.

Cushioned Starting of A-C Motors —H. L. Lindstrom, project engineer, Westinghouse Electric Corp.

Report from National Machine Tool Builders' Association Electrical Committee-Chairman J. J. Jaeger, asst. manager engineering, Pratt & Whitney Div., Niles-Bement-Pond Co.

New Developments and Applications L. W. Herchenroeder, industry engineer, Westinghouse Electric Corp.

Priorities and Allocations for the Ma-

chine Tool Industry-H. L. Tigges, executive vice president, Baker Bros., and consultant, Machinery Div., National Production Authority.

Machines-W. J. Stuebbe, chief electrician, The G. A. Gray Co.

Temperature Rating of Motors-W. H. Formhals, manager A-C motor en-Wiring and Wire Grouping on Large gineering, Westinghouse Electric Corp.

#### **Boron Treated Steels Prove Efficient in Use**

By Glen C. Riegel, Chief Metallurgist, Caterpillar Tractor Co.

Boron treated steel which is once again forcing itself back into the steel industry got its biggest boost during World War II when critical alloying metals became scarce.

On a weight basis, 0.002 per cent boron can cut the nickel-chromiummolybdenum requirements of a steel heat to a half or a third. In fact, boron steels take so little boron that they have been dubbed "needled steels" during the past world conflict.

At that time the steel industrymostly under the direction of Army Ordnance, the American Iron & Steel Institute, and the Society of Automotive Engineers-worked out specifications for five different types of boron steels. These specifications were the basis for steels that went into a lot of armor plate and anti-tank projectiles.

After the war when the richer alloys became available again, boron use began to drop. However, such was not the case at Caterpillar Tractor Co. which began using it in mill heat lots in 1339 one of the first companies to do so.

Caterpillar replaced SAE 2345 and SAE 4340 steel in heavy duty axle shafts of 3½ to 5½ in. diam on motor graders and wheel tractors at the beginning of World War II with a leanalloy boron steel. This material has been continually specified since that time, and the application has consumed from 15,000 to 20,000 tons.

In cold-headed bolts and cap-screws, as well as stud stock heat treated in cold finished bars, the firm has consumed from 25,000 to 30,000 tons. This makes a total of over 50,000 tons of boron steel used by Caterpillar.

No field failures of parts made of boron-treated steels have been experienced due to the use of boron as an alloying element. By Caterpillar's method of testing the extremes of a mill heat before applying it in production materials, the irregularities of the earlier boron treating of mill heats are avoided.

Through use of the SAE end-quench hardenability test for proving the hardening power of boron treated steel and by use of the spectrograph for proving the presence of boron, a fairly successful control is maintained.

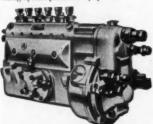
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In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

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Fresh-Air Heating, Ventilating, and De-Frosting Systems Achieve a New High in Motor Car and Truck-Cab Comfort, Safety, and Driver Health



Manufactured in the country's largest, most modern plant devoted exclusively to automobile heater production. Engineered for, and sold exclusively to car and truck manufacturers.

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Heater Division

CLEVELAND, OHIO

EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES +TAPPETS +HYDRAULIC VALVE LIFTERS +VALVE SEAT INSERTS +ROTOR PUMPS + MOTOR TRUCK AXLES + PERMANENT MOLD GRAY IRON CASTINGS + HEATER-DERROSTER DIAITS - SNAP RINGS + SPRINGTITES SPRING WASHERS + COLD DRAWN STEEL + STAMPINGS + LEAF AND COIL SPRINGS + DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

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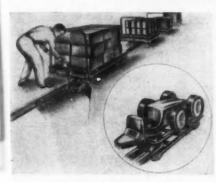


San Francisco Cable
Cars are world reinowned for conveying folks up and
idown that hilly city
in their unique and
dependable manner.

WEBB Towveyor Floor Type Towing Conveyor

Faster and more efficient is this Webb System for handling packages, boxes, barrels, tote boxes, parts, etc. There is nothing above to obstruct—the continuous chain conveyor runs in a steel slot below the floor. Loading and unloading can be done at any point.





A simple towing pin device is attached to any standard 4 wheel truck or trailer, 2 wheel truck with dolly, and operator either engages or disengages by lowering or raising the pin. When the pin is dropped into the slot, the trolley attached to the Webb Drop-Forged Rivetless Chain picks up the load automatically.

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#### CALENDAR

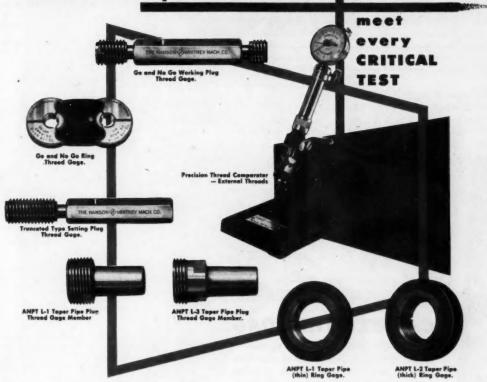
OF COMING SHOWS AND MEETINGS

#### Conventions and Meetings

- Chamber of Commerce Annual Mtg. Washington, D. C. .....Apr. 30-May 2
- Materials Handling Conference, Chicago ......Apr. 30-May 4
- A.E.R.A. Convention, Chicago .... May 7-9
- Society for Experimental Stress Analysis, National Bureau of Standards, Wardman Park Hotel, Washington, D. C. .....May 16, 17, 18
- Amer. Society for Quality Control, Cleveland ......May 23-24
- SAE National Summer Meeting, French Lick, Ind. .....June 3-8
- American Society of Mechanical Engineers semi-annual meeting, Toronto, Canada ......June 11-16
- American Society for Testing Mat'ls
  Annual Meeting, Atlantic City,
  N. J. June 18-23
- SAE National West Coast Meeting, Seattle, Wash. .............Aug. 13-15
- First European Machine Tool Exhibition, Paris .......Sept. 1-16
- SAE Tractor and Production Forum, Milwaukee, Wis. ......Sept. 10-18
- Sixth National Instrument Conference and Exhibit, Houston, Texas Sept. 10-14

- Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, Ohio......Oct. 1-4
- SAE National Aeronautic, Production Forum, And Display, Biltmore Hotel, Los Angeles, Calif. ....Oct. 3-6
- National Metal Congress and Exposition, Detroit, Mich. ...Oct. 15-19
- SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill. ...Oct. 29-30
- SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill. ......Oct. 29-31
- SAE National Fuels and Lubricants
  Meeting, Drake Hotel, Chicago
  Ill. .....Oct. 31-Nov. 1
- American Petroleum Institute (31st Annual Meeting), Chicago, Ill. Nov. 5-8
- American Society of Mechanical Engineers (annual meeting)....Nov. 25-39

Hanson-Whitney THREAD GAGES



The defense program, now spiraling, is going to wear out thousands of gages — especially those of sub-standard quality.

To insure continual close tolerance production, and longer gage life, specify Hanson-Whitney Gages—manufactured of the best materials to exacting Federal Government Standards, subjected before shipment to a battery of rigid Hanson-Whitney tests.

The H-W gage group illustrated provides you with a complete inspection gaging set-up for practically any thread regardless of form, pitch, or major diameter.

If your prints call for special design thread gages and gaging techniques, feel free to call upon our Engineering Staff for counsel... for this service has always been an integral part of our "Production Insurance" program.

HANSON-WHITNEY COMPANY . HARTFORD 2, CONN. . DIVISION OF THE WHITNEY CHAIN COMPANY



For additional information regarding any of these items, please use coupon on page 64

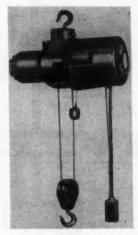
#### MH-25—Hoists; Sling Chains; Wire Rope Slings

American Chain & Cable Co., Inc., is displaying the products of three of its hoist, in capacities from 250 to 1000 lbs

Booth 137 divisions at the Materials Handling Exposition.

Wright Speedway Electric Hoists are featured by the Wright Hoist Divisions. The new Frame B Speedway electric and balanced for hook suspension is shown, along with other models of capacities up to and including 10 tons. The new Wright Safeway hand hoist is also being demonstrated.

ACCO registered sling chains are being shown by the American Chain Divi-



Wright Frame B Speedway electric hoist.

sion. New items for this division include the ACCO sling chain adjuster for handling unbalanced loads; the new automatic lock on ACCO bundling chains; and ACCO registered sling chains equipped with the newly designed foundry hooks.

The Wire Rope Sling Dept. is showing ACCO registered wire rope slings made in a wide range of standard construction as well as for special application. Emphasis is given to the Dualoc endings on ACCO registered wire rope slings. Dualoc endings which have the full catalog strength of the rope, have two steel collars giving flexibility for closer snubbing and easier rigging.

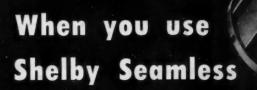
Booths 427, 428

#### MH-26-Diesel-Electric **Power Units**

Displayed for the first time at the Materials Handling Exposition are Diesel-electric power units for electric industrial truck operation, as newly perfected by Ready-Power Co., Detroit, Mich. Four models have been developed to power trucks of 6000 lb capacity and larger. The Ready-Power Diesel models employ the same principle as the widely-used gasoline models-an en-gine-driven generator producing continuous electrc power right on the truck chassis.

Also featured will be the new gasoline-operated Ready-Power model H-A which was introduced only a few





the basic shape is already made

You can save time, money and steel—and make a better automotive product—when you use Shelby Seamless Tubing for hollow cylindrical parts. Compared to solid bar stock or forgings, this high quality seamless tubing requires much less cutting or boring. Since fewer operations are required, man and machine hours are less, rejects are fewer, production of all automotive parts is speeded up.

The products shown here are typical of this more efficient method of manufacturing. Some of these parts are quite complex, but each was made from Shelby Seamless Tubing, faster and at lower cost than identical parts machined from solid bar stock. In several cases production has been doubled or tripled—costs savings have run as high as 50 percent—rejects have been reduced to zero.

Shelby Seamless Steel Tubing is pierced from a solid billet of quality steel. As a result, there is no longitudinal weld to weaken the tube. This processives you the strongest, most dependable tubular steel section that money can buy.

Shelby Seamless Steel Tubing is manufactured in a complete range of diameters, wall thicknesses and analyses to meet every need. When you plan for future automotive applications, remember Shelby Seamless for its ability to increase strength, reduce weight and cut your production costs.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

(Tubing Specialties Division)
COLUMBIA STEEL COMPANY, SAN FRANCISCO
PACIFIC COAST DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



**Shelby Seamless Steel Tubing** 

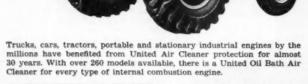
UNITED STATES STEEL

## PROTECTION STANDARD FOR DIRT-MOVING MACHINES

Wheel loaders . . . tractors . . . graders . . . self-propelled scrapers . . . dump trucks . . . whatever the type of earth-moving equipment, United Specialties Company provides an oil bath air cleaner to fit the need. With over 99 percent dirt-trapping efficiency, the scientifically designed United Cleaner permits only abrasive-free air to enter the engine — even under worst dust-saturated conditions.

Proved and specified for the toughest jobs, United Oil Bath Air Cleaners protect internal combustion engines in every field of use. We invite your inquiry.





#### UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION - CHICAGO 28
MITCHELL DIVISION - PHILADELPHIA 36
BIRMINGHAM TI. ALABAMA

\* AIR CLEANERS \* METAL STAMPINGS \* DOVETAILS \* IGNITION AND TURN SIGNAL SWITCHES \* ROLLED SMAPES



For additional intermation please use coupon on page 64

months ago. Model H-A is suitable for use with 4000 lb fork trucks, 10,000 lb platform trucks and 6000 lb crane trucks.

Booths 313, 314, 315

#### MH-27—Trucks With Automotive Type Controls

A new 10,000 lb capacity sitdown type electric industrial truck with controls like those of an automobile has been designed by the Automatic Transportation Co., Chicago, Ill., for display in the Show—one of four new units in Automatic's LFS (sitdown) series being introduced. The others, with capacity



Automatic's 10,000-lb capacity, sitdown type electric truck, the Skylift LFS-100 with automative type controls.

ties of 7000, 8000 and 9000 lbs, afford complete lines of both standup and sitdown trucks ranging from 3000 to 10,-000 lbs. The new Automatic Skylifts are designated LFS-70, 80, 90, and 100.

The two larger models lift to 110 in., with a collapsed height of 83 in. The LFS-70 and 80 are standardized for lift of either 115 or 119 in., with collapsed height of the mast in either case of 83 in.

The larger models (LFS-90 and 100) have an over-all length of 93% in., plus forks; width of 48 in. at the broadest point; and single lift of 59 in. They can right-angle stack in aisles measuring 106 in. plus load length, and turn in intersecting aisles 80 in. wide.

The LFS-80 is 92% in. long, plus forks, and the model 70 is an inch and

Automatic joint snugness . . . anti-back-bend . . . anti-whip . . .

## YOU GET THEM ALL

... with the world's finest timing chain from the world's largest chain plant



WHY SEGMENTAL
BUSHINGS MEAN BETTER
PERFORMANCE FOR YOUR ENGINE



Removable case-hardened segmental liners or busbings extend across entire chain width—double bearing surface... halve bearing pressure on joint

Bushing takes wear at joint —elongation of link hole or eye is negligible

Broached holes

Smooth, casehardened pin, free to rotate between segmental bushings, presents every part of surface for wear

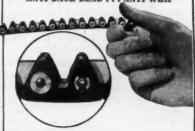
#### **AUTOMATIC JOINT SNUGNESS**

Segmental bushings are made with slight bow

After initial assembly in chain,

Bow in bushing acts to keep a snug joint, maintaining chain pitch

ANTI-BACK-BEND . . . ANTI-WHIP



Built-in check in joint limits bushing rotation, checks back-bend and whip

Today every designer is on the spot. More than ever, he has to be sure he's getting the best components for his engine. And he also has to be sure the source is dependable.

That's why Link-Belt Timing Chains and Sprockets are your best bet. It's the highest load-carrying chain on the market. Yet designs for some leading manufacturers measure only  $^{11}\!\!/_{6}$  inches in width! This narrower design will save valuable space in your engine.

More—the tremendous facilities of the new Link-Belt plant are your assurance of a continuing supply. Here high-level research is constantly in progress . . . to keep you out in front with the latest technical developments.

Let our engineers cooperate in the proving of your latest engine. We will gladly supply a test drive to your specifications. Details are in engineering catalog No. 2065.



Great flexibility of Link-Belt Duplex Timing Chain is exploited for timing and fuel pump drive on this engine. Either face of the chain meshes with wheels.

12,380

LINK-BELT COMPANY: 220 South Belmont, Indianapolis 6, Ind. Offices in principal cities.



## HARD KNOCK THE PUTS a materials testing laboratory right at your fingertips.

A bowling ball is made to specifications that are tough! Tougher than most machine parts.

It takes hard knocks with a bounce, and at the same time retains its perfect balance and smooth finish.

In the heat of a game it is subjected to corrosive perspiration, floor wax, water, chalk, and even cleaning detergents. Yet a genuine Ace Hard Rubber Bowling Ball remains faithful to its owner for years.

That's because it's made of tough Ace Hard Rubber, with tensile strength of 9,000 psi, flexural strength of 11,500 psi. And it's the same impervious material that's used for piping acids.

It's a good example of fabricating, too, with amazingly close tolerances on weight and diameter. It starts as a molding. Then it's ground and polished to give that smooth, satiny feel. Finally the finger holes are machine cut.

Yes, it shows some of the reasons why Ace Hard Rubber is preferred for thousands of parts for machines, appliances, automobiles, furniture, etc. Chances are it's best for some

of your parts, too. Why not give it a whirl?





HARD RUBBER and PLASTICS

MERICAN HARD RUBBER COMPANY

11 MERCER STREET . NEW YORK 13, N. Y.

Materials Handling Show

For additional information please use coupon on page 64

one-half shorter. Both are 45½ in. wide; have single lift of 61 in., require right angle aisles of 103 in. plus load length; and operate in 79-in. intersecting aisles.

Booth 259

#### MH-28—Mold and Die Truck



Highly maneuverable for handling molds and dies from storage shelves to presses, this 1000 b capacity "Rite Hits" combination truck and work table is affered by the Wellington Machine Co., Wellington. Ohio. Built like a conventional hand truck and equipped with T-section demountable-time rubber tired wheels, its elevating platform is actuated by an hydraulic jack. The die separating device consists of a boanthat swings completely around, and a sling, as shown. The sling is attached to the top of the die and the platform is slowly lowered, separating the die. Boom can be lifted from its socket and carried in the top of the top of tray when not in use.

Booths 924, 1023

#### MH-29—Three-Way Operating Freight Truck

A new battery-operated freight truck for use in plant pick-up or delivery is



Market Forge battery-operated freight truck having 3-way operating positions.

AUTOMOTIVE INDUSTRIES, May 1, 1951

### HERE'S THE MAN to give you expert brazing service

He's the Handy & Harman field service engineer. You V like him because he really knows his stuff. He was hend-picked and specially trained for the job. He is a friendly chap with a wide background of experience that covers both domestic and was time production. He loves to take off his coat and get his hands dirty - and he's an artist with a torch. Give him a brazing problem and he's a buildog - he'll never let go until it's licked. And if it's too tough to lick e spot, he's backed by the top-ranking and most experienced Research and Engineering staffs in the business - originaryrs of the well known low emperature silver brazing alloys EASY-FLO and SIL-FOS. He's ready and eager to give you the following services - without cost or obligation.

DEMONSTRATIONS — of silver alloy brazing in your own shop. SURVEYS — to determine if, where and how silver alloy brazing in your own snop. can benefit you.
ENGINEERING AID - to assure correct joint design and most effective application. effective application.

SAMPLE BRAZING — of specific parts to determine the best way to braze them. to braze them,
PRODUCTION AID to help work out the procedure that will aive you the brazing production you want at lowest cost. give you the brazing production you want at lowest cost.

give you the brazing production you want at lowest cost.

EMPLOYEE TRAINING — either in H&H silver alloy brazing schools

or by a program set up in your own plant. or by a program set up in your own plant.

TECHNICAL BULLETINS — making available the technical facts and data an eliver allow brazing as developed in our Research TECHNICAL BULLETING — making available the technical facts and data on silver alloy brazing as developed in our Research Laboratory. Loboratory.

CALL OR WRITE — the nearest office listed below and say when we shall savuice man to call

you would like a field service man to coll.

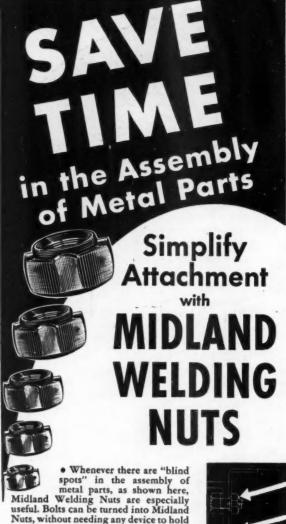
### HERE'S THE BULLETIN to give you full facts

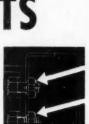
This new 28-page Bulletin 20 gives the whole remarkable EASY-FLO and SIL-FOS brazing story — including useful information on joint design and fast heating and production methods. It's a "must" for all who design or produce metal assemblies. Write for a copy today.

EASY-FLO SIL-FOS



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be the answer to some of your assembly

the nuts from turning. Their use helps

Investigate! Midland Welding Nuts may

### THE MIDLAND STEEL PRODUCTS CO.

6660 Mt. Elliott Avenue . Detroit 11, Mich. Export Department: 38 Pearl St., New York, N. Y.

World's Largest Manufacturer of **AUTOMOBILE** and TRUCK FRAMES



Air and Vacuum POWER BRAKES ...

to speed production.



Air and Electro-Pneumatic DOOR CONTROLS





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one of the exhibits found at booth of the Market Forge Co., Everett, Mass. Called the Load-Mobile, the Marforge truck provides 3-way operating positions for utmost safety, comfort and maneuverability. The operator can either sit facing away from the loadwhich is the normal position; face the load-for narrow passages; or stand on the special step provided for easy access on and off the truck.

Made in two models—3000 lb and 5000 lb capacity, the Load-Mobile travels at 3.5 to 4.0 mph with no load. With full load, the 3000 lb truck goes at 3.0 mph and the 5000 lb at 2.5 mph. The freight truck may also be used as a

tractor.

Booths 924, 1023

### MH-30-Load Lift With **Labor Saving Pump**

An aluminum single-unit oil tank and pump combination manufactured by Market Forge Co., Everett, Mass., and co-developed by Borg-Warner, enables the new Marforge Lightning Load-Lift to raise loads 25 per cent easier and 25 per cent faster the company claims. The hydraulic fluid is contained in the unit above the dual pumps, allowing the



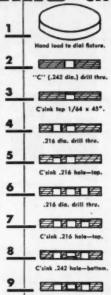
1951 Market Forge Lightning Load-Lift having aluminum single-unit oil tank and pump combination.

fluid to circulate by gravity, rather than being sucked up into the pump from a separate tank underneath. "Aeronautic" design and machine tolerances are stated to be responsible for the increased efficiency of the "Lightning-Lift."

The truck is lowered by a simple right-angle flick of the handle-a design innovation that eliminates stooping or bending to lower the loads. The truck raises and lowers with the same lifting handle while the operator stands. This new one-unit pump also eliminates need for gaskets, dust boot and needletype valve. It fits interchangeably into all standard Load-Lifts and may be purchased as a separate unit.

(Turn to page 110, please)

### Hodine CASE HISTORY NO. 29



TOOLED TO PROCESS BAKELITE BONDED GEAR BLANKS

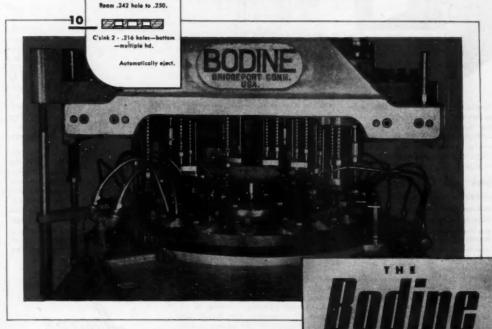


PRODUCTION: The Bodine 42-30 Dial Type Automatic Drilling Machine (one of 6 standard sizes) is equipped with 10 drilling spindles. Production is 20 pieces (or 200 operations) per minute.

ACCURACY: Center hole held concentric with O.D. within .004" T.I.R. Postion of two .216" Dia. holes held to tolerance of  $\pm .001$ ". Size of center hole held to .250  $\pm .0005$ ".

This is another example of accurate drilling and countersinking at high speeds...the reason why users of Bodine machines have little worry from competition in repetitive production jobs.

Drilling, Milling, Tapping, Screw Inserting, Staking and Assembly may be performed singly, grouped, or all in one machine. Send part or blueprints for recommendations.



"You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools." AUTOMATIC DIAL TYPE DRILLING, MILLING.

TAPPING, AND SCREW INSERTING MACHINES



Cleveland engineers can save production dollars and valuable working time by designing a CLEVELAND TAPPER which will not only combine several operations but also tap groups of holes at one stroke of the machine.

Rockwell.

### Check with Cleveland FIRST

Only CLEVELAND offers you all these features.

- Precision hardened and ground lead screw.
- Fully automatic or manual control.
- Precision depth control for blind hole tapping.
- Heat treated alloy steel spindles for maximum strength.
- Easily changed spindle speeds.
- Exclusive super sensitive clutch reduces breakage and increases tap life.
- Positive coolant and lubricant supply under constant control of operator.
- Rigidly constructed to give years of service.
- Maximum safety for operator and machine.

Write for "Production Tapping Guide" No. AT-3

THE CLEVELAND TAPPING MACHINE CO.

A Subsidiery of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO



For additional information please use coupon on page 64

(Continued from page 108) Booths 306 to 310

### MH-31—Five New Fork Trucks

At the Exposition, the Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, Ohio, is exhibiting five new fork trucks in capacities ranging from 2000 to 8000 lb.

The Baker Ballet, an intricate demonstration of the trucks in operation, will demonstrate the maneuverability, ease of operation, safety, and operator convenience. Demonstrated also will be the first showing of a new attachment which combines in one hydraulic mechanism three separate movements. In



Baker 2000 Ib capacity fork lift truck, Type FS.

another area in its booth the company will show in action major components of the trucks such as power axle, trailing axle and frame.

The company's new Type FS centercontrol fork truck, designed for all applications where loads are 2000 lb, 48 in. long, has a width of 32½ in.; an outside turning radius of 65 in., requiring minimum intersecting aisles of 59 in. Right angle turn is 79½ in. plus length of load. Overall height is 83 in.; telescoping lift is 130½ in. loaded; with initial lift of 65 in. loaded.

The operator sits on a formed padded seat with back rest in an off-center position from which the ends of the forks are easily visible. Steering is of the automotive type. Direction of travel is selected by a lever, and five speeds in either forward or reverse are controlled by an accelerator pedal.

Cushioned dynamic braking is obtained by reversing the travel controller. Because of this feature it is impossible to plug the truck. It is also declared to save wear on the service brake and to be a safety feature in descending ramps.

(Turn to page 112, please)



### ON THE BIG PIPELINES

A lot of new Layne wells and pumps are serving the big inch pipelines,—and more are being installed. The selection of these fine water supply systems was based on such features as;—basically sound engineering ideas, higher overall efficiency, top flight quality,—and their ability to handle peak production on an around the clock schedule. Installed by Layne's own field crews and according to Layne's rigid standards, they will give years and years of fine service with little or no upkeep expense.

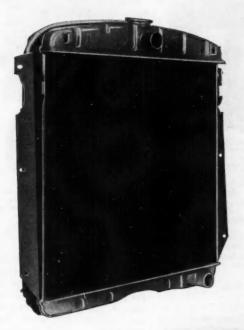
Layne is the Nation's greatest organization engaged exclusively in the designing and building of modern high efficiency well water systems. Layne has made more installations than any other firm in the world and is widely recognized as being the best qualified for any size job from a single unit to a dozen—or even hundreds. If you need more water, contact Layne or send for new catalogs or bulletins.

LAYNE & BOWLER, INC. General Offices, Memphis 8, Tenn.



### Expect more

from a
Harrison-engineered
cooling system



When a manufacturer of buses, trucks or tractors puts his cooling problems up to us, he can be certain that careful consideration will be given to every factor affecting performance and durability.

In Harrison's engineering laboratories, the cooling system is studied as a whole. Not just the radiator, but fan, pump, shroud, mounting—all are checked with equipment especially designed to simulate actual driving conditions. The result—a radiator engineered to do a specific job and do it well.

We invite manufacturers to avail themselves of our engineering, service and production facilities.



HARRISON RADIATOR DIVISION
GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

RADIATORS . THERMOSTATS . HEATERS
DEFROSTERS . OIL COOLERS



### "3 KEYS TO SATISFACTION"

72 pages of valuable information on scientific design and metallurgical data-write for it now . . .

Success in designing steel components-avoidance of localized stresses - good design and bad design from the metallurgical viewpointsteel selection and treatment as they affect the design engineer. This invaluable book gives the answers!

### Climax Molybdenum Company



F26

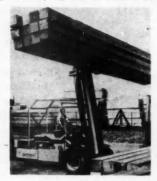


For additional information please use coupon on page 64

(Continued from page 110) Booth 505

### MH-32—Heavy-duty Fork Lift Truck

Unveiled at the Exposition is a heavy-duty fork Liftruk in three capacities-5, 71/2 and 10 tons-a new



Silent Hoist & Crane Co. heavy-duty fork Liftruk.

product of the Silent Hoist & Crane Co., Brooklyn, N. Y. Maneuvering freely, the Liftruk turns around and faces a load in an aisle as wide as the machine is long. Three-point wheel suspension provides ground contact regardless of irregularity of the surface.

Other New Materials Handling Products at the Show, received too late for full description, are listed as fol
Company and Product
American MonoRail Co.,
Convention Single Crane
Bosworth Mfg. Co.,
Cleveland, Ohlo
Conveyall conveyor,
Model 75
Conco Engineering Works,
Mendota, Ill.
Type SD Trolley Hoist,
S and 7½ ton capacities
Creaceast Pruck Co.,
Palletter, pallet teiring
truck, 4000 lb capacity
Island Equipment Corp.,
Long Island City, N. Y.
New system for loading
and unloading palletized
shipments by truck
Magilne, Inc., Pinconning,
Magnesium Dockboards;
Hand Trucks; Die Tongs
Motor Generator Corp.
Troy, N. Y.
Automatic battery
charger for industrial
trucks, 3 KW Model 672
Prime Mover, Model 15,
1500 lb capacity
Skarnes Engineering and
Supply Co., Minneapolis, Minn.
Rol-A-Lift Truck, Model
M-2-H full description, are listed as follows: Booth No. 216, 217, 230, 231

WITTEK DC-OU HOSE CLAMPS The Standard the Automotiv Industry Type A-Radiator Hose Connections Type G-88-Booster Broke Hose Connections No. G-B-HH

> Type HP-High Pressure Hose

Wittek Noc-Out Hose Clamps are designed in a variety of types made in many sizes for use by the automotive industry. Because they provide the most practical leakproof hose connection, they are specified by the leading manufacturers as standard, original equipment for automobiles, buses, trucks and tractors.

Heater Hose

Write for descriptive literature.



Address

Superior Paint Performance to your product's sales features.



# Bonderite





Quality products should look the part—on the showroom floor and in service. To guard the good looks of painted metal, leading manufacturers use Bonderite before painting.

Bonderite, Parker's corrosion resistant paint base, converts the metal surface to a nonmetallic phosphate coating, provides a sure anchor for paint and protection for the metal against the formation of rust and corrosion.

Bonderite application is positive, quick, easy to control, dependable, low in cost, and effective on products that range from automobiles and trucks to kitchen mixers.

Your painted metal product should have the assurance of superior paint performance that Bonderite brings. Full information is yours on request,







### Parker Products meet government specifications

Available for your guidance—a list of government finish specifications and the Parker Products which meet their requirements. Write for your copy.



Bonderite, Parco, Parco Lubrito-Reg. U.S. Pat. Of

PARKER

Parker Rust Proof Company

2178 East Milwaukee Avenue, Detroit 11, Michigan

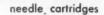
BONDERITE-Currosian Resistant Paint Base - PARCO COMPOUND-Rust Resistant - PARCO LUBRITE-Wear Resistant for Friction Surfaces



IT'S THE ROAD TO SUCCESS...

THE FAMOUS ORIGINATORS OF NEEDLE CARTRIDGES AND NEEDLE BEARINGS WITH NEEDLE RETAINERS

loose needles

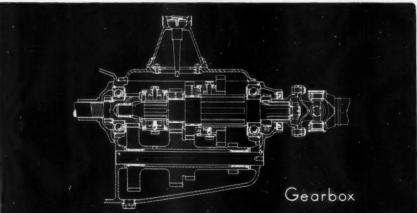


complete bearings









133 a 137 BOUL NATIONAL



RUEIL-MALMAISON (S.O.) FRANCE



# Don't Let IRON and STEEL SCRAP Gather Cobwebs!

Somewhere, back in a corner of your plant or snop, there's some scrap iron and steel. Maybe quite a pile, gathering rust. Maybe some obsolete machinery, long unused. Maybe odds and ends that total many tons. You've meant to have it hauled away, but somehow it's still around.

### Now's the time to sell it!

Call the nearest scrap dealer; ask him to give you a price. He'll pay good money for it. Prices are high... the nation's steel plants need scrap badly. With a stepped-up defense program under way, scrap is more than ever a vital ingredient of steel production. Industry must help take up the slack—fast.

A constant flow of scrap means greater tonnages of iron and steel. It means more finished products made of iron and steel. You can help . . . and help yourself as well. Get that scrap in circulation. Get it on the job!

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.



If you don't know the name of a scrap dealer, look one up in the yellow classified pages of the telephone directory. You'll find a listing there.

### BETHLEHEM STEEL



Another new development using

B. F. Goodrich Chemical Company raw materials



cutting block that cuts costs, too!

Cut Rite Bloc" made by Rubber Engineering and Chemical Co., Lake Zurich, Ill.

ERE'S another success story that may help you-that shows how Hycar rubber improves products while it cuts costs.

The picture here shows a laminated cutting block made with a Hycar rubber compound. And what a difference it makes, compared to ordinary blocks. With formerlyused blocks, leather, rubber, cloth and other materials are frequently soiled by sawdust or discoloration.

This problem-and others-went by the boards when the Hycar-made block was developed. Cutting noise

is greatly reduced. Dies remain sharp longer. There's uniform cutting efficiency in any weather. The block is good for millions of cuts. The wear-down in normal service is approximately '4" per year.

It's another score in the long list of Hycar-helped successes. For Hycar is so versatile that it resists heat and cold, water, weather and wear, gas, oil, chemicals and more damaging conditions.

Hycar may answer your problems -may help you improve or develop a product. Demand now exceeds formation, please write Dept. HD-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

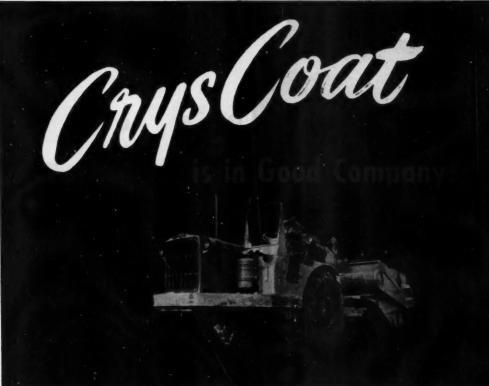
supply, but limited quantities are available for experimental work. For helpful technical advice and in-

**B. F. Goodrich Chemical Company** A Division of The B. F. Goodrich Company

Need extreme temperature resistunce? Hyeur has it-plus abrasion resistance and more advantages.

See Sweet's File for Product Designers, Materials Section, for further data on Hycar **GEON** polyvinyl materials

HYCAR American rubber . GOOD-RITE chemicals and plusticizers . HARMON organic colors



\*Prepares Metal Surfaces for Painting

\*Patented Material and Process

TEAM-UP the husky "Caterpillar" Scraper with the "Caterpillar" Diesel Tractor and you've got a couple of sluggers ready to tackle any earth-moving job that comes along. Typical of "Caterpillar" thoroughness is the paint finish. It, too, is designed to take terrific punishment. That's why these big yellow sluggers are CrysCoated before painting. The Oakite CrysCoat Process assures long-lasting paint adhesion; prevents peeling; resists corrosion.

The Oakite Crys Coat Process may be just what you're looking for. With minimum equipment... in minimum time... at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

### The Oakite Crys Coat Process Offers These Extras:

- 1. Eliminates operations...uses less equipment
- 2. Cuts operating time
- Uses less chemicals for cleaning and conditioning
- 4. Reduces heating costs

- Saves cost of expensive acid-proof tanks and equipment
- 6. Saves cost of frequent descaling and desludging
- 7. Drag-out costs are less because of low original cost of solution
- 8. Saves paint
- Cuts cost of rejects caused by rusting before painting

FREE Crys Coar Process for use in beforepaint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

OAKITE PRODUCTS, INC., 28A Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS . METHODS . SERVICE





### AS SPECIFIED BY JIC

- Dual-voltage primary transformer
- 2 Gasketed enclosure
- 3 No knockouts in enclosure
  - Mounting feet on back of enclosure

# **Built** to meet two sets of standards

The Joint Industry Conference electrical standards for industrial equipment and the performance standards of Westinghouse for the complete line of Life-Linestarters® are combined in this one model 11-206-NJ combination starter. The features assure safety to personnel, uninterrupted production, long equipment life.

Look what these JIC features provide:

LOW-VOLTAGE CONTROL . . . protects operating personnel. A transformer and fuse block provide 110-volt current for control circuits. Dual-voltage transformer primary for either 220 or 440-volt service, 50 or 60 cycles.

GASKETED ENCLOSURE... keeps out dirt, oil, splashing liquids. Rubber gasket between door and panel makes enclosure semi dust-tight. All walls are solid—no mounting holes or knockouts. Mounting feet on back of enclosure replace mounting holes.

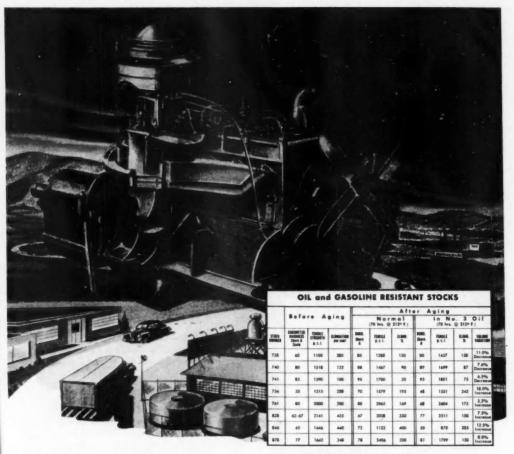
PLUS standard Life-Linestarter features: SLAMPROOF HANDLE... protects against rough handling . . . interlocked design prevents cover from being opened when handle is in "ON" position. Sure-grip handle of high-strength alloy must be moved beyond "OFF" to the "OPEN COVER" position to open cover.

"DE-ION®" ARC QUENCHER...lengthens contact life and reduces maintenance... destructive arc is confined, divided and quickly extinguished in ½ cycle or less.

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FULL DETAILS AND BULLETIN ON REQUEST

TRATFORD . CONNECTICUT

AUTOMOTIVE INDUSTRIES, May 1, 1951

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Photo micrograph of DUALOY\*



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\*The United Engine & Machine Company (manufacturers of Silv-o-lite pistons) are licensed by Fairchild Engine & Airplane Corporation under patents 2396730 and 2455457 to use the Al-lin process in the manufacture of bi-metallic molecular bonded pistons.
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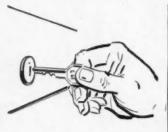
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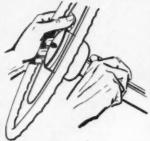
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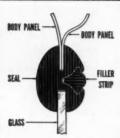


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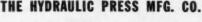
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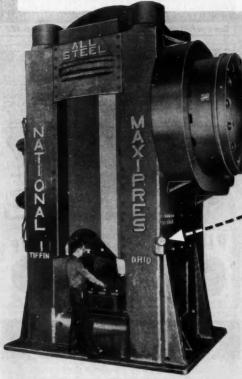
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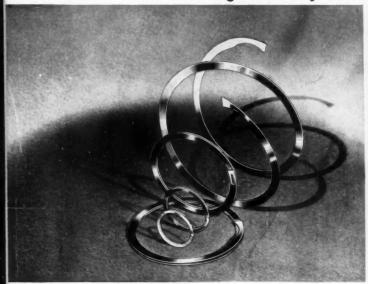
FOR INTERNAL COMBUSTION ENGINES

— BOTH GASOLINE AND DIESEL

ZOLLNER MACHINE WORKS, FORT WAYNE, IND.

"Makes Any Engine a Better Engine"

### Spirolox saves machining - assembly time - parts - space - weight





### ... Send for Test Samples!

### Prove how you hold moving parts together better with



Practical men usually visualize best when they have the actual product in hand. That is why we suggest that you write for a sample Spirolox Retaining Ring, to get the feel of it. Or perhaps you'd like some for experiment. Mail our Spirolox Application Engineer a print of your product and you will be sent the appropriate rings for test, without cost or obligation, of course.

WHAT THIS REMARKABLE RING BRINGS YOU

Spirolox Retaining Rings provide a surprising total of betterments which every machine manufacturer wants. They position and lock all kinds of moving parts. They make machines simpler, lighter, more compact. They eliminate costly machining, and the nuts, pins, keys, collars, and the like formerly used in fastening. These rings spiral-into their grooves easily, saving time in manual installation. They adapt readily to fixtures for automatic production line installation. They stay put, yet they come out again at the flip of a screw driver, ready for re-use—a great advantage when machines are serviced in users' hands.

When you spiral-in a Spirolox Retaining Ring, one more part is positioned precisely and locked securely. Due to its twoturn coil construction. Spirolox locks in the groove under thrust, will carry loads up to its full shear strength—will not jump out or squeeze out. Due to the lighter weight of Spirolox, centrifugal force does not tend to affect its locking characteristic.

Get FREE Test Samples for a convincing test in your own plant . send a print of your product today. For further information on our products, see our catalog sheet in section 4K-R of Sweet's 1951 Catalog.



AD No. G-2871R





gapless · concentric · requires no special tools · easy-in, easy-out · re-usable · stays put

Spirolox Betaining Rings are covered by United States Patent No. 2,450,425 and Foreign Patents. Other patents pending. Copyright 1949 Ramsey Corporation. Product of Ramsey Corporation, for 31 Years Makers of Original Equipment and Replacement Fiston Rings. Office: 3704 Forest Park Boulevard, St. Louis 8, Missouri, Factories: St. Louis and Sullivon, Missouri; Fruisport, Michigan; Toronto 8, Ontario, Camada.